

NEW ZEALAND
JOURNAL OF
Agriculture
JULY - 1957



How to buy

FIVE ACRES

FOR A FIVER!

Pasture land left to greedy weeds soon loses its carrying capacity. Buying it back economically is the job for Weedone. Take Buttercup. One gallon of Weedone '57' (creeping and celery leaved) or Weedar M.C.P.4 (giant) costing less than £5 to spray, controls five acres of buttercup and allows lush green stock-fattening grasses and clovers to come away. You get similar economy with thistles, ragwort, docks (Weedone PEG) and most other pasture weeds. That's because Weedone varies its 2, 4-D formulations to break down the resistance of practically every weed type. In terms of extra profit gained, Weedone control is a real bargain!

WEEDONE



Genuine Weedone Products are recognised by this distinctive sign. Make sure you get genuine Weedone from your Weedone Service Distributor.

PRODUCTS OF IVON WATKINS LTD.
Home of the Weedone Service

Volume 95

Number 1

15 July

1957

(Established 1910)

NEW ZEALAND JOURNAL OF *Agriculture*

Published by

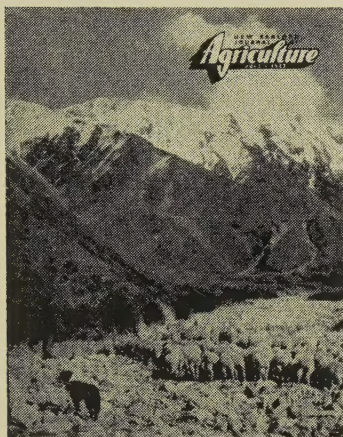
Direction

of

Rt. Hon. K. J. Holyoake,

Minister of Agriculture

This Month's Cover



Merino hoggets being shepherded back to the heights after eyeclipping on Glen-tanner Station in the Mackenzie Country. In the background are the peaks of the Ben Ohau Range. The station, situated between Lake Pukaki and the Hermitage, Mt. Cook, was taken up early in the development of Canterbury, in 1858. Mustering on this high, hill country run is hazardous and in many places only walking mustering is possible. Here a shepherd's best friend is his dog; a thoroughly trained, intelligent animal with a high degree of endurance. Colour photograph by National Publicity Studios.

New Zealand Department of Agriculture

HEAD OFFICE:

Dominion Farmers' Institute Building,
Featherston Street, Wellington

DIRECTOR-GENERAL:

E. J. Fawcett

DEPUTY DIRECTOR-GENERAL:

R. B. Tennent

ASSISTANT DIRECTOR-GENERAL:

P. W. Smallfield

DIVISIONAL DIRECTORS:

Animal Industry ..	J. E. Mellwaine
Animal Research ..	J. F. Filmer
Dairy ..	H. A. Foy
Extension ..	J. W. Woodcock
Horticulture ..	A. M. W. Greig

Editor: G. J. Neale

TABLE OF CONTENTS

Farming in Karamea	H. H. Tocker	2
Practical Equipment for Poultry Keepers	H. K. Mullins	5
Seed Production in New Zealand: Browntop	J. G. Richards	7
Senior Appointments in Extension Division		16
Dairy Produce Graded for Export		16
Trees on the Farm: Trees Suitable for Canterbury	W. H. Jolliffe	17
Recent Research Work: Tussock Grassland	Shona M. Maclean	19
Identification and Control of Rushes	L. J. Matthews and D. I. Glue	20
Automatic Spraying Equipment in Hawke's Bay Orchards	N. B. Congdon	26
Care of Livestock during August		34
Oversowing, Topdressing, and Fencing of Hill Country (Seasonal Notes)		35
Container for Air Transport of Bees	D. Roberts	36
Natural Hatching of Eggs	B. J. Russell	41
Meteorological Records for May		43
"Weaner Coops" Keep Young Pigs Warm	A. Longwill	43
The Home Garden	A. G. Kennelly	45
A Reliable Hive Lid Fastener	R. G. Nairn	55
Molybdenum in New Zealand: Clay and Gumland Soils of Auckland Province	N. A. Clarke, C. M. Blick, and H. McM. Bull	56
Radio Broadcasts for Farmers		64
Farm Building Construction	H. W. T. Eggers	65
Tractor Wheel Equipment for Swampy Ground	L. H. Weston	72
Drainage by Pumping	D. F. Scott	73
Biscuits, Cakes, and Puddings without Eggs	Christine Lyons	82
Bath-mat with Matching Scuffs	Eleanor S. Campbell	90
Shoes for Children	Maud B. Strain	91
The Flower Garden	K. H. Marcussen and Rosalie A. Campion	96

SUBSCRIPTION RATES

The "Journal" is issued monthly. The subscription within New Zealand is 10s. a year; the overseas subscription is 13s. (sterling). The "Journal" may be ordered from any bookseller or newsagent or direct from any office of the Department of Agriculture. Individual copies are available from Publications Section, P.O. Box 2298, Wellington, at 1s. a copy, post free.

Subscribers' inquiries (preferably accompanied by the address cut from a recent "Journal" wrapper) should be sent to the nearest office of the Department of Agriculture.

COPYRIGHT PROVISIONS

Articles in "The Journal of Agriculture" are copyright, but may be reprinted provided both the "Journal" and author are acknowledged and the articles are not associated with advertising material.

The Minister of Agriculture does not accept responsibility for any of the private and trade advertisements included in this publication.

All correspondence relating to the "Journal" should be addressed to the Editor, "The New Zealand Journal of Agriculture", P.O. Box 2298, Wellington.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

Farming in Karamea

By H. H. TOCKER,

Farm Management Officer, Department of Agriculture, Christchurch

THERE are few areas in New Zealand where isolation has been such a hindrance to progress as in the small farming district of Karamea, about 68 miles north of Westport and 38 miles from the railhead at Seddonville. Some information on the farming problems of the district was obtained in a survey made in 1955 by officers of the Economics Section of the Department of Agriculture, and this article presents some of the results of this survey.

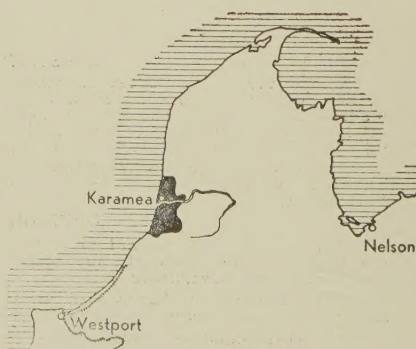
THOUGH gold originally attracted people to the district in the 1860s, the first organised settlement did not occur until 1874, when, under a scheme sponsored by the Nelson Provincial Council, settlers arrived to take up a block of 4000 acres on the south bank of the Karamea River. Reports of the early 1900s show that dairying had begun, and by 1906 the local dairy factory manufactured 27 tons of butter.

Development appears to have been steady until the considerable setback caused by the Murchison earthquake in 1929. Karamea then lost its main outlet through the destruction of its river port by the silting up of the river estuary with tremendous quantities of sand brought down by the river from slips in the mountainous interior. A considerable drainage problem was also created by a rise in the water-table over much of the area. Drain-

age is still a problem and is a major factor limiting farm production.

Land Utilisation

Of the 92 farms in the district, with a total area of 27,070 acres, the survey covered 76 farms comprising 20,948



Location of the survey area.

▲ Arapito Valley, on the south side of the Karamea River.

acres, or 77 per cent. of the area occupied for farming. Of the farms visited, 50 per cent. of the land, or about 10,400 acres, was classified as bush-clad hills, too steep for farming, or high, scrub-covered terraces; 40 per cent. comprised alluvial flats or easy terraces; and 10 per cent. comprised coastal sand dune country.

The broad land-use pattern is set out in Table 1.

TABLE 1—LAND UTILISATION ON 76 FARMS IN KARAMEA

	Area acres	Percentage of total area
Fallow, crop, buildings	194	1
Swamp	1,417	7
Pasture	7,323	35
Scrub and bush ..	12,014	57
	20,948	100

The figures show the small area actually used for farming, under 40 per cent. of the occupied acreage. Though 7323 acres were in pasture, only 1500 acres were classed as improved pasture, the remainder being infested with rushes, flat weeds, buttercup, and Yorkshire fog. Clovers were generally absent.

Farming Systems and Management

Because access to the railhead is over a winding hill road and freight charges to bring in supplies and to get stock to west coast and Canterbury markets are consequently high, few sheep are run and dairying has developed as the predominant system of farming. Also mild temperatures and an annual rainfall between 75in. and 100in. are suitable to pasture growth. About 90 per cent. of the farmers are engaged in dairy farming.

In the 1953-54 season, for which management data were obtained, only 47 of the 76 farmers sowed any new pastures, a total of 150 acres or a little over 3 acres per farm being sown. With an average farm size of 276 acres, of which about 105 acres was effective farm area, the acreage of new pasture was a very light pasture renewal programme.

Generally the pasture was sown directly out of old grass; about one-third of the area sown was on ground newly cleared of logs and stumps and later cultivated. This latter practice resulted in poor pasture establishment. Nearly all seed mixtures were broadcast by hand, the most common mixture per acre comprising 10lb. to 15lb. of perennial ryegrass, 10lb. of short-rotation ryegrass, 3lb. to 5lb. of red clover, and 2lb. to 3lb. of white clover, with timothy sometimes added. Though Certified seed was sown, the resulting pastures were generally not good.

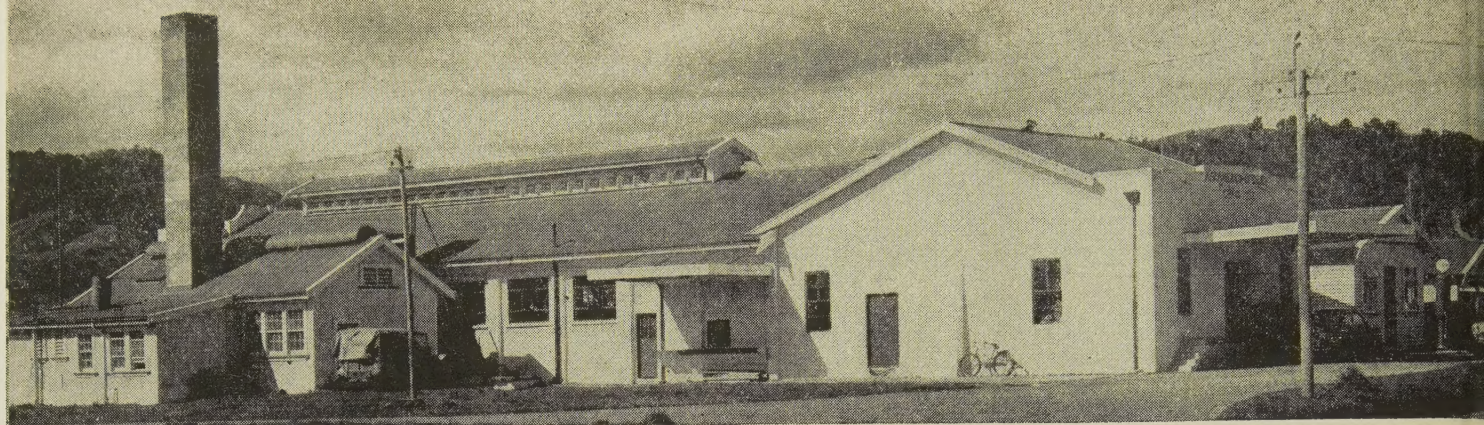
FARMING IN KARAMEA



Rolling coastal sand country sown to pasture out of blackberry, rushes, stumps, and old grass. The coastal sand country comprises hummocks and hollows which have to be levelled before cultivation can be attempted.



Terrace country. In the foreground is new pasture developed out of an area of scrub, fern, stumps, and logs similar to the area on the far side of the fence.



The Karamea Co-operative Dairy Company's factory at Market Cross. The annual production from this factory is about 415 tons of butter.

Some form of rotational grazing was favoured by nearly 60 per cent. of the farmers, though 14 of the 76 farmers preferred set paddocks for day and night grazing. Electric fences were used on 27 farms to ration graze paddocks in spring, but on only one farm was strip grazing used all the year. Forty-four farms saved hay, about 7 acres per farm being set aside, and silage was made on 15 farms. Cropping for supplementary forage was negligible, only 3 farmers having any crop.

The amount of lime and superphosphate used during the year of the survey was not great, and 16 farmers did not use either. The high cost of £15 per ton for superphosphate landed at Karamea is probably the reason for the small amount used. Lime from Westport cost £3 per ton, but the position is much improved with the opening of a lime works in the district.

Stock Management

Of the 74 dairy herds in the survey, 48 were of mixed breeds, 20 were predominantly Jerseys, 4 Ayrshires, and 2 Shorthorns. Table 2 shows herd sizes.

TABLE 2—NUMBER OF DAIRY HERDS BY SIZE GROUPS

No. of cows	No. of herds	Percentage of total herds
10 and under 20 ..	5	7
20 and under 30 ..	20	27
30 and under 40 ..	21	28
40 and under 50 ..	13	18
50 and over ..	15	20
	74	100

The average size of the dairy units was 258 acres, with an effective area of about 98 acres, and the average carrying capacity was 38 cows and replacements. The smallest herd had 12 cows and the largest 70 cows. Usually about 20 per cent. of the herds were replaced annually with heifers reared on the farms.

For winter supplementary feed seven farmers used hay, and 37 farmers used hay in conjunction with silage and run-off areas. Run-off areas were used by 53 dairy farmers, 16 of whom made no other provision for wintering. Actually, this use of run-off areas for

wintering means that when the cows are dried off they are turned into the bush to fossick for themselves until next calving. Though the practice has merit in that the farm is spelled in winter, it results in quite heavy losses from accidents in the bush, and frequently in poor production as a result of cows calving in low condition.

The majority of herds began calving in August, though a few began a month later, but calving was spread over 2 to 3 months in many cases owing to infertility.

Production

The average production per cow in 1953-54 was 252lb., with half the herds producing less than 250lb. per cow and three herds having an average production of less than 150lb. per cow. Twelve herds, or slightly over 16 per cent. of those in the survey, produced between 300lb. and 350lb. per cow.

TABLE 3—BUTTERFAT PRODUCTION PER COW

Butterfat per cow lb.	No. of herds	Percentage of total herds
100 and under 150 ..	3	4
150 and under 200 ..	13	18
200 and under 250 ..	21	28
250 and under 300 ..	25	34
300 and under 350 ..	12	16
	74	100

On a per acre basis production was low, and 78 per cent. of the farms visited produced less than 150lb. of butterfat per acre of effective farm area. With a large percentage of the farm areas in bush and scrub, the area on which the cows grazed (exclusive of run-off areas) was taken as the effective farm area for computing butterfat per acre.

TABLE 4—BUTTERFAT PRODUCTION PER ACRE OF EFFECTIVE FARM AREA

Butterfat lb.	No. of farms	Percentage of total farms
50 and under 100 ..	32	43
100 and under 150 ..	26	35
150 and under 200 ..	11	15
200 and under 250 ..	4	6
250 and over ..	1	1
	74	100

The production of pig meat was the only sideline of farms. Breeding sows were run on 61 of the 76 farms visited, and there was an average of one breeding sow to 12 cows milked. The number of sows per farm ranged from 1 to 26. Usually the sows were farrowed twice a year and the first litter carried to baconers and the second sold as porkers.

Potential of District

Though it is a small district, Karamea has a considerable potential as a dairying area.

The present effective dairying area is estimated at 7000 acres, but with drainage and other land improvement work it is considered that this can be increased to about 16,000 acres. With a possible carrying capacity of one cow to two effective acres and a production of 300lb. of butterfat per cow, or 150lb. per acre, it should be possible for the butter production from the district to be increased from the present output of 415 tons per annum to about 1200 tons.

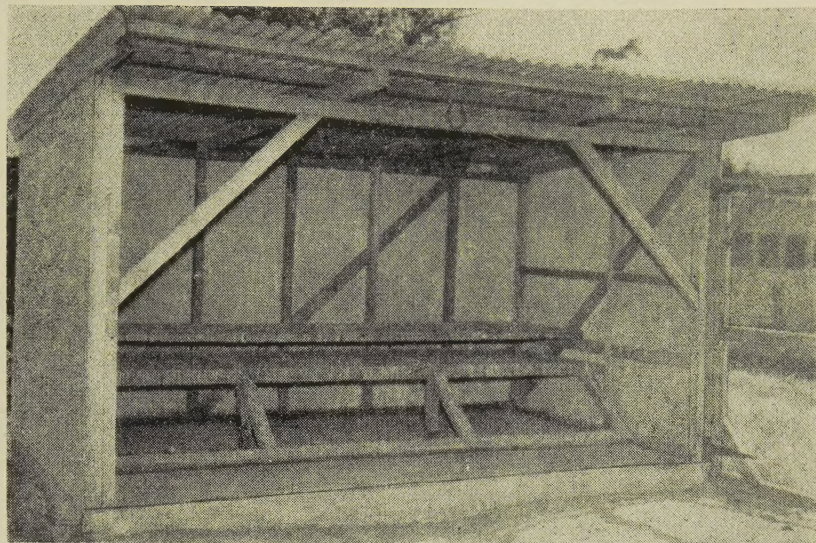
Of course a number of problems have to be overcome. The 3000-acre Kongahu swamp will have to be drained, and this will be a large-scale project. Drainage is also required on some of the alluvial flats, but where this is done high-producing pastures can be established.

More attention will have to be given to pasture establishment and maintenance and to the provision of more hay and silage as supplementary feed for winter. The layout of a number of farms needs to be improved.

To enable much of this land-improvement work to be undertaken additional capital will be necessary, and until recently there appears to have been a reluctance on the part of local farmers to borrow money for development work. However, the injection of capital into the area and the adoption of sound land-improvement techniques and good farm management should enable the district nearly to treble its present production.

Practical Equipment for Poultry Keepers

By H. K. MULLINS,
Poultry Instructor,
Department of Agriculture, Hastings



A permanent type of colony house with a concrete floor.

[R. W. Orr

POULTRY laying houses, brooder sheds, colony houses, and in fact most poultry equipment have become largely standardised throughout New Zealand. A Poultry Instructor has very good opportunities to observe first hand any new ideas associated with commercial poultry production and to assess their value to the poultry industry as a whole. The object of this article is to illustrate some of the less conventional equipment adapted successfully on many farms throughout the Hawke's Bay and Poverty Bay districts.

Housing for Growing Stock

THE orthodox, gable-roofed colony house for growing stock can be seen on almost any farm throughout the country, and most will agree that it has proved satisfactory under all types of conditions. The open-fronted house illustrated above has been adapted on several farms in the Hawke's Bay and Poverty Bay districts with excellent results.

These sheds, being of a permanent nature, are better suited to farms where space is rather limited and

natural, free-range conditions are not available to young birds. The size of this house is 11ft. 6in. x 7ft. and it will accommodate 180 pullets from 6 weeks of age until they are ready for housing in the laying sheds.

A concrete floor can be seen in this shed, but the majority have earth floors. The concrete has the advantage of being easily hosed out between batches of pullets and is in every way satisfactory.

Each colony house has its own run measuring 120ft. x 35ft. which is re-sown every year with clover. The

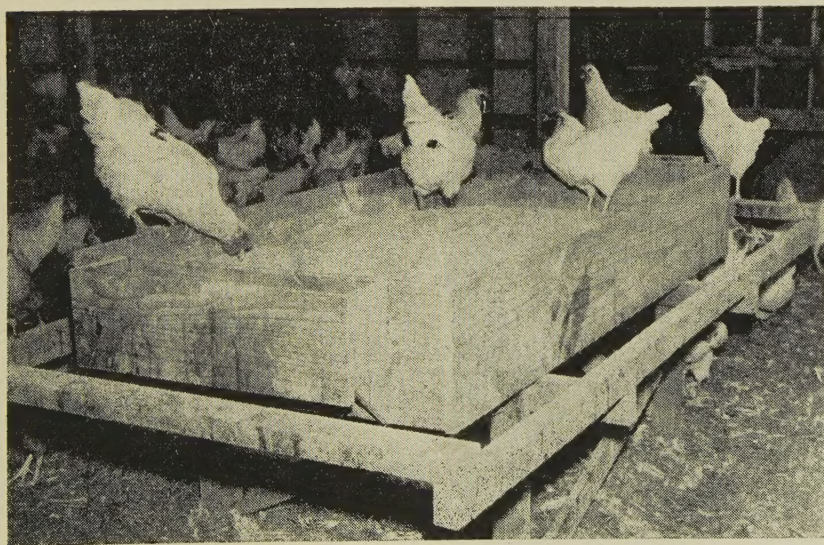
wire frame under the perches is 18in. from the ground and has 1in. netting. The ramp, which permits the young chickens to reach the perches easily, also keeps the stock from their droppings, thus minimising the risk of spreading disease in young birds.

One disadvantage with this house is that the chickens are exposed to cats at nights unless, where necessary, some form of front can be fitted to the house for the first few weeks. This is comparatively simple. To fit the front of this colony house a netting frame into which has been incorporated a small door has been constructed, thus permitting the birds to be locked in overnight. The frame is nailed up temporarily when pullets require catching for deworming or shifting and is then stored away until required again.

Mash Hoppers

Dry-mash hoppers vary in size and design on almost every poultry farm. Perhaps the most popular types are made of 44-gallon drums standing on an 18in. platform. These are quite effective but extremely hard to fill for other than a very tall man.

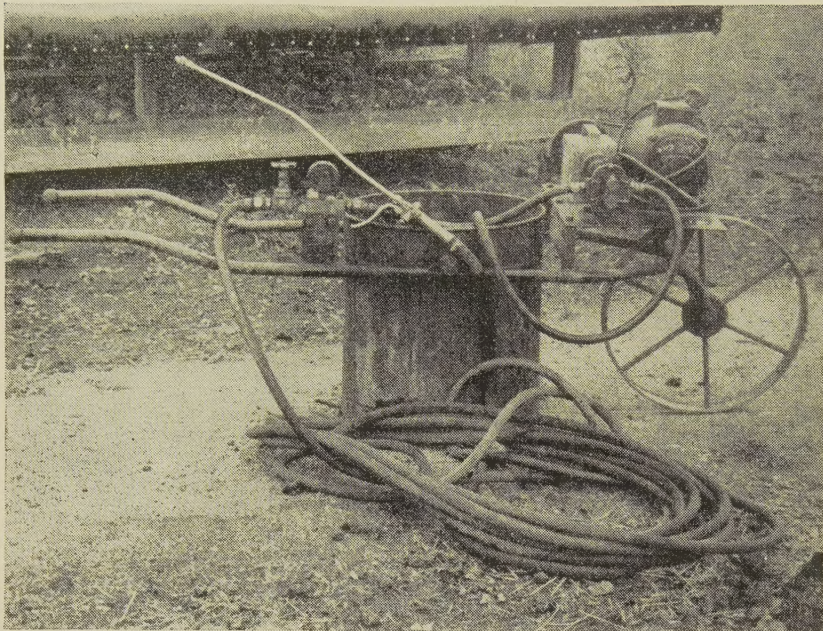
The hopper illustrated, which has several desirable features and possibly one or two undesirable ones, has nevertheless proved efficient on two Hawke's Bay farms. It is 7ft. long, 3ft. wide, and 30in. high over-all from the floor. Meat meal and shell grit containers have been incorporated at each end, thus permitting the birds free access to these ingredients at all times. A perch has been built on each side of the hopper.



[R. W. Orr

A feature of this mash hopper is that it is easy for a short person to fill. At each end there are containers for meat meal and grit. The hopper does not become badly contaminated with droppings.

PRACTICAL EQUIPMENT FOR POULTRY



[K. R. Wade]

A portable spray outfit which is easily made and particularly efficient.

The chief advantages with this hopper are that it is very easily filled by a small person, there is no waste, and there is ample space for a good number of birds to feed at once.

Considering the open nature of the hopper, one would conclude that it would be full of droppings at the end

of a month. This particular hopper was observed when it was filled and some weeks later when empty and it was clean. The reason for this is of course that any droppings which fall in the mash **dry out** and are eventually broken up and eaten. It could be argued that this is detrimental to the health of the stock, but for adult birds

use of this hopper is probably no worse than the accepted practice of throwing grain into the manure under the perches. If there were an outbreak of intestinal coccidiosis among young stock, this type of hopper would have to be closed or removed. A few birds will also roost on the hopper at night, but if they are discouraged from the beginning, little trouble will be experienced. To keep mash as fresh as possible it is recommended that this hopper should be completely empty before it is refilled with mash.

Spraying Equipment

The cleaning out and spraying of poultry houses to eradicate red mite and lice are not relished by most commercial producers. Lack of suitable equipment makes the job hard, with the result that it is often put off far too long.

The portable spray outfit illustrated originated on the Cook Hospital Farm at Gisborne and has proved most efficient. An electric $\frac{1}{2}$ h.p. motor and pump are mounted on the front of a barrow, and a drum containing the disinfectant is at the rear. The pump, which is of standard pattern, is similar to those used commercially for weed spraying.

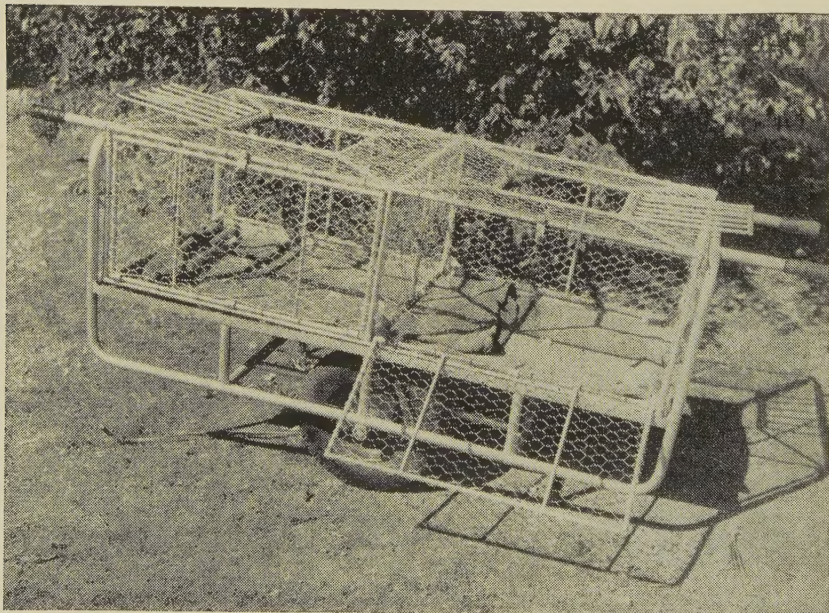
A 30ft.-long hose is attached to the pump, and a constant pressure of 20lb. per square inch will force creosote or any similar disinfectant through this hose very effectively. If the intake valve on the pump is opened and the return valve is closed, the hose connecting the pump may be used to draw the contents out of a 44-gallon supply drum into the container on the barrow.

It is a sound idea to use a mask or shade when spraying ceilings with this equipment. A piece of 6in. x 6in. celluloid fitted like a tennis shade will protect the eyes from dust and spray. Fortunately most poultry sheds are connected with electricity, thus making it comparatively easy to wheel the barrow through each shed and connect the flex to the light socket.

A Serviceable Trolley

The trolley illustrated was constructed on a farm. It has a useful capacity for adult birds or perching pullets. Over-all measurements are 4ft. 9in. x 2ft. 6in. x 16in. high. The two 16in. tyres ensure easy manoeuvring at all times. The cage, which is detachable from the trolley, is constructed of piping and divided into two compartments. Access to the interior is by two gates opening from one side of the trolley and there are also two 12in. x 12in. trap doors on top. Handles are fitted at both ends, thus eliminating the necessity to turn the cart round when it is operated on narrow paths.

This trolley has many uses and can be an asset on any farm where the paths and roading are reasonably flat.

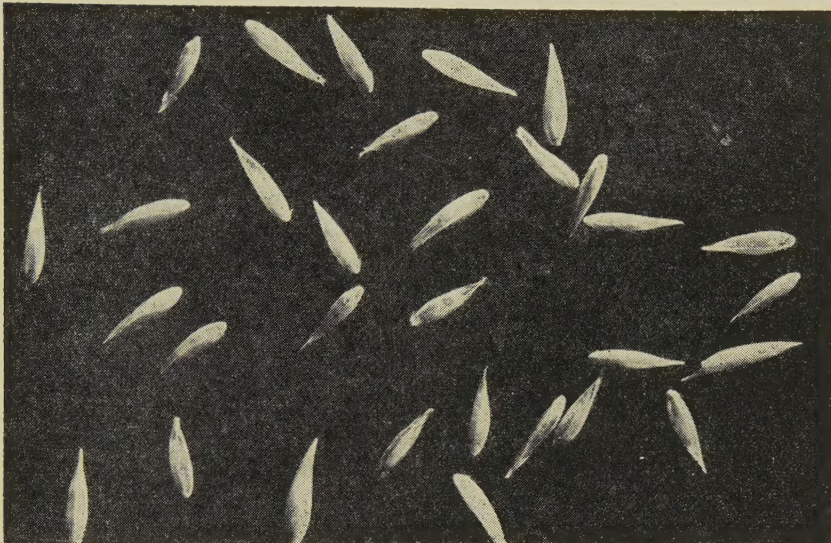


[R. W. Orr]

The wire cage on this trolley is detachable from the pipe chassis.

Seed Production in New Zealand Browntop

By J. G. RICHARDS,
Instructor in Agriculture, Department of Agriculture, Oamaru



The areas of New Zealand where browntop is grown for seed production. Each cross represents about 100 acres.

← Browntop seed (about 15 times natural size).

▼ Mature seed heads of the three principal *Agrostis* species in New Zealand. From left—Browntop, creeping bent, and redtop.

OF the grasses introduced into New Zealand browntop has become one of the most common, for in many regions it has replaced much of the lowland tussock, particularly in Canterbury, Otago, and Southland. Its aggressive nature has resulted in what were once pure tussock swards becoming pure browntop swards. However, like other plants it is a weed when growing where it should not grow—on first-class and second-class lands which are capable of maintaining ryegrass-white clover or cocksfoot-dogstail-red clover swards—but its presence as a constituent in pastures on much third-class, unploughable land is looked on with much favour.

MANY plants are often referred to by several common names, and were it not for the use of standard botanical names there would be much greater confusion in understanding which plant was being referred to. Members of the grass genus *Agrostis* are no exception to this multiplicity of names, for Sir Bruce Levy, in "The New Zealand Journal of Agriculture" for February 1924, recorded that the following names were used to describe one or all of the three chief species in that genus: Redtop, browntop, Waipu browntop, fiorin, twitch, creeping bent, carpet bent, velvet bent, *Agrostis alba*, *A. vulgaris*, *A. capillaris*, *A. canina*, *A. stolonifera*, *A. palustris*, and *A. tenuis*.

This example is one of the most extreme, but fortunately most of these discrepancies have been cleared up, and the chief terms now in use are redtop, browntop, and creeping bent, known botanically as *Agrostis alba*, *A. tenuis*, and *A. stolonifera* respectively. Of the three species, browntop (*A. tenuis*) is the most important in New Zealand agriculture and is grown over a wide range of soils and climates.

Description of Plant

Browntop is a fine-leaved, rather erect grass, and where it has room to spread short rhizomes are produced. The ligule at the base of the leaf blade is very small and often there is no ligule, contrasting with the prominent





EMPIRE RUBBERWARE

IS THE BEST

IN CO-OPERATION WITH PRACTICAL DAIRY FARMERS, EMPIRE HAS EVOLVED TWO OUTSTANDING PRODUCTS—

1. Empire Universal Ring-less Inflations are outstanding. They last longer, and give superior milking. They fit and protect all standard cups, but need no mouth piece ring and are therefore definitely more hygienic.
2. The best tubings you can buy are Empire's crack proof. They are soft and flexible, a pleasure to work with, and chemically protected against cracking. Even the Claw Tubes last longer than a season.

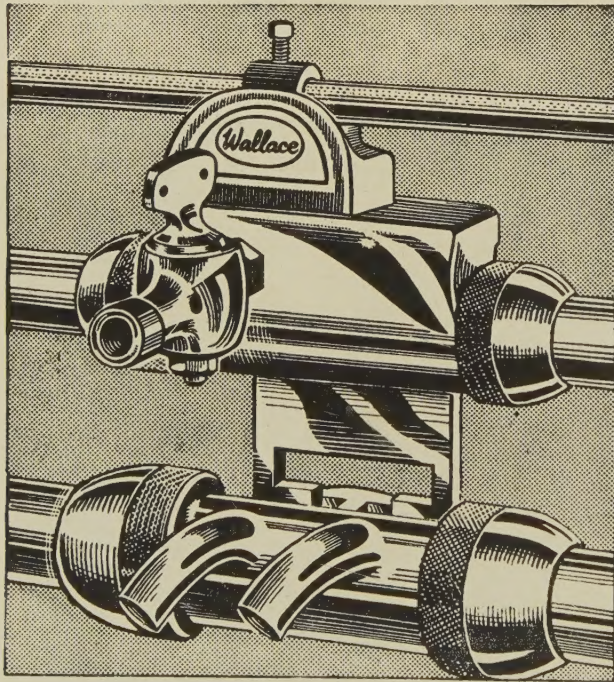
EMPIRE RUBBERWARE IS THE RESULT OF LONG, CAREFUL RESEARCH AND PRACTICAL TESTING.

EMPIRE PRODUCTS LIVE UP TO THE MAKER'S CLAIMS

Empire Service Dept. and Testing Laboratory are at your disposal.

EMPIRE RUBBER MILLS LTD. — WOOLSTON.

Distributors: COTTON BROS. LTD. — All Centres.



D. McL. WALLACE LTD.,

Head Office: NEWMARKET, AUCKLAND.

P.O. BOX 9010 NEWMARKET. PHONE 22-079.

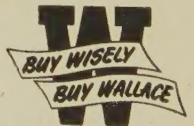
Branches at Hamilton, Te Aroha, Thames, Whakatane, Whangarei, Dargaville, New Plymouth, and Stratford.

This year Wallace Milkers are

AGAIN

BETTER - THAN - EVER

Further improvements and modifications have made this year's Wallace Milker an even better model than before. To this add the excellency of workmanship that goes into every unit, and you have the reasons for its outstanding efficiency and reliability. And yet, despite all this extra built-in quality and value, Wallace is still one of the lowest priced units on the market! When you buy Wallace, you buy the best.



Messrs. D. McL. Wallace Ltd.
P.O. Box 9010, Newmarket, Auckland.

Please send me full details of the latest Wallace Super Milkers.

NAME

ADDRESS



Typical rolling clay country of South Otago from which browntop seed is harvested.

and characteristic ligules displayed by redtop and creeping bent. This characteristic identifies browntop from the other two species.

The leaves of browntop are about 1/4 in. wide at the bases and taper gradually to points. A perennial plant capable of producing seed for several seasons, its maturity is rather late, seed being harvested from mid-March to May in Otago and Southland. The seed head is fine and the plant in flower has a rather attractive purple tinge which gives a flowering field a distinctive appearance.

Though three distinct species of *Agrostis* are recognised botanically, in the field a fairly wide range of types can be observed, suggesting that some crossing between the original species has taken place. As a result some browntop areas contain more than one type of plant. Coarse types of browntop and types showing a larger ligule, but otherwise typical browntop, are occasionally observed. In addition, a fairly distinctive type of browntop grows in certain localities, particularly on the Canterbury Plains. This type, which has been named dryland browntop, is not as suitable as true browntop for use as either a pasture plant or a lawn grass.

Distribution in New Zealand

The distribution of browntop in New Zealand is possibly the widest of all introduced grasses, for it grows under a wide range of conditions—from the coast to the upland tussock area, from North Cape to Bluff, and on good, poor, and indifferent soils. In some areas it is the dominant species, in some a major species, and in others just another grass. On the bulk of third-

class, steep, and unploughable lands it is a most valuable species because as well as providing valuable grazing, it helps to bind the soil, thus lessening the ever-present menace of erosion. On the unploughable bush-burn country of the North Island its inclusion in the seeds mixture for surface sowings is advisable so that when the ryegrass, cocksfoot, and clovers begin to run out the browntop is there to take their places and thus, by its ability to form a tight, compact sward, assist to check reversion to fern, manuka, and piripiri or bidi-bidi (*Acaena anserinifolia* syn. *A. sanguisorbae*).

Apart from its use as a pasture species, it is famed as a lawn grass, usually being sown with chewings fescue.

Seed-producing Districts

The production of browntop seed in New Zealand is confined mainly to the South Island, Otago and Southland being the principal areas. In Otago Clutha County is the main seed-producing area, and in Southland Wallace and Southland Counties produce most of the seed. Counties in Canterbury the boundaries of which include the foothill country also produce some seed, but the acreage saved for seed in those parts is much less than farther south. The counties in Canterbury which produce browntop seed are Levels, Ashburton, Geraldine, Mackenzie, and Waimate. In favourable seasons small acreages have been harvested in parts of Nelson, Marlborough, and Hawke's Bay.

The chief seed-producing areas are those where generally soil moisture is adequate. The soils of these areas

are somewhat stiff and heavy, and these conditions, combined with adequate moisture, are the best for browntop.

Adequate moisture is all important for the browntop plant. Where soils are inclined to dry out yields of seed are usually poor. Ample rain during spring and early summer is important for the production of high yields of seed.

All browntop seed now harvested comes from paddocks and blocks of grazing land into which the plant has come as a volunteer. Seed is no longer sown to establish a seed-producing stand, better, high-producing seed crops being obtained at less cost by allowing the plant to establish naturally. This volunteer establishment is quite rapid; within 2 years from a bare field a dense browntop cover will arise which can be harvested in another 12 months. A method that has been adopted for the establishment of a stand is to sow turnips, feed them off, and allow the browntop to come in. With good seasons such a field should produce high yields of seed for 3 or 4 successive years. However, the bulk of the seed comes from areas that have been sown to pasture which has run out and which are to be ploughed up within 2 or 3 years from the time the browntop becomes the dominant grass.

Browntop begins to show up after about 3 years in pastures which have had insufficient lime and phosphate and poor drainage, or if poor types of grass and clovers have been sown. Under these conditions browntop may become dominant within 4 years. When the ryegrass and white clover



AT LAST ...

a natural source of
quick energy to save
and improve stock and
help the farmer

(Should be with every shepherd)



Staminal is a restorative, energising and stimulating food, immediately available to the blood stream and muscles. Sustains weak and perishing lambs which have not had their first drink from their parent, without injury to their delicate digestive system. A solution in warm water 50% Staminal and 50% water, about three teaspoons at a time will put lambs on their feet, and enable them to drink from the ewe. Ideal for all classes of stock and racehorses.

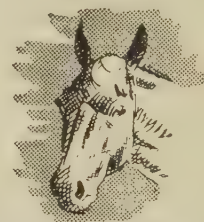


Obtainable from all Stock Agents.

A DEXTROSE PRODUCT

STAMINAL

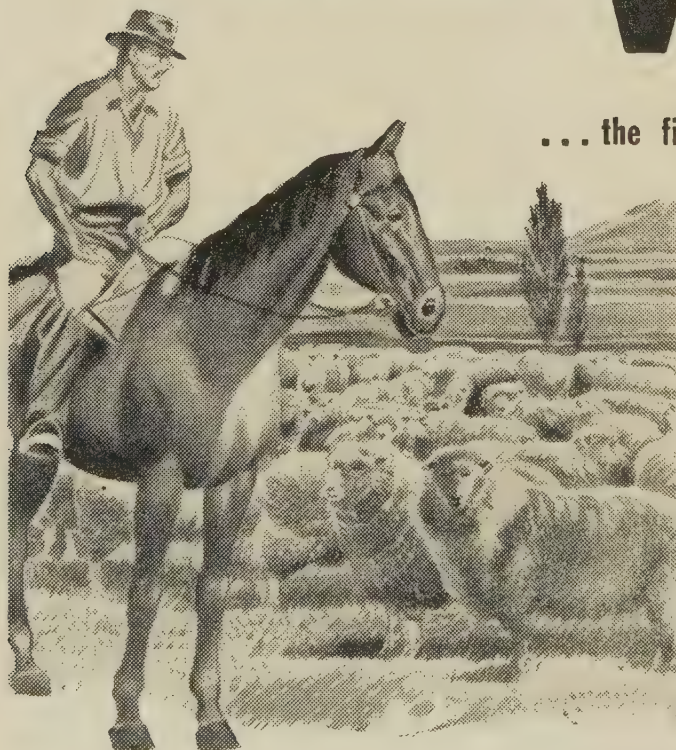
Staminal Co. Ltd., P.O. Box 134, Dunedin.



BRAND WITH

Vacmark

... the finest Quality Sheep Branding Fluid in N.Z.



Vacmark is legible, long-lasting. Vacmark will not wash off the fleece even if rain comes after the brand has been applied. Takes perfectly to a wet fleece.

Vacmark scours out completely. Vacmark washes out easily in wool scouring works. There is no staining or damage to the wool.

Vacmark is easily applied. Vacmark can be used with a conventional branding iron or automatic branding pad.

Vacmark has four bright colours. Vacmark is sold in four colours—black, red, blue and green. The colour of Vacmark in the tin is not a true indication of the final colour of the brand. A few days after application, the brand brightens considerably.

Vacmark is economical. One gallon of Vacmark will brand about 600 sheep.

Vacmark is fully approved. All colours of Vacmark are approved by the New Zealand Department of Agriculture as wool marking preparations for the purposes of the Stock Act, 1908.

**Available from all stock
and station agents.**

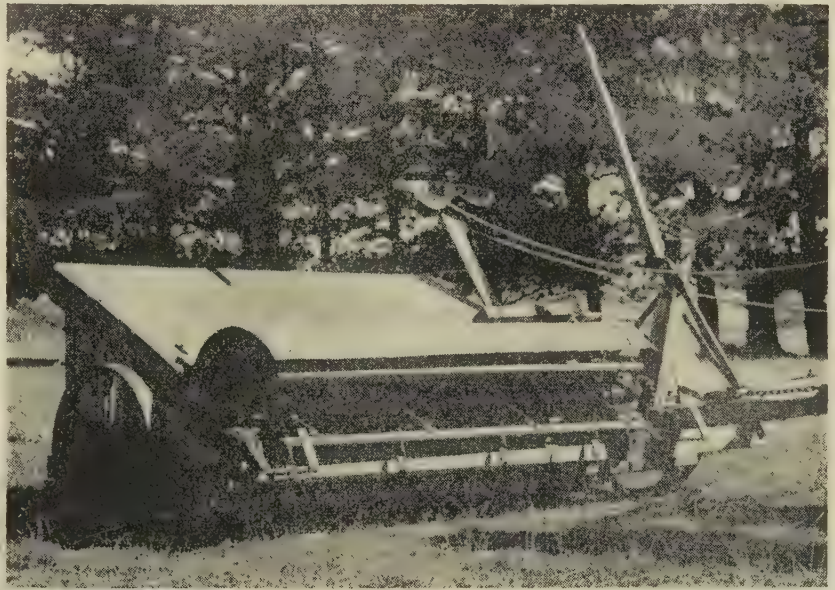


A large type of chain drum stripper built in Balclutha to the requirements of a farmer with long experience of harvesting browntop seed. The machine can harvest many hundreds of acres a year and in average going will strip 6 to 8 acres an hour while travelling at 5 to 7 miles an hour.

For many years strippers in various forms were the chief machines used for the harvesting of browntop seed, but they are now used mainly for the harvesting of relatively small areas or parts of fields where it is uneconomic for header harvesters to work.

Front view of the most widely used type of beater stripper. →

▼ Rear view of the same machine.



die out these swards will produce crops of browntop seed for 4 or 5 years. The pasture is then usually put under the plough. The average life of a sown sward on the browntop country of South Otago is 7 to 8 years.

In contrast to the poorly treated ryegrass-white clover pastures, those which receive adequate lime and phosphate, are drained, and contain good, persistent strains of grasses and clovers will not tend to run to browntop until they are 6 to 7 years old. Browntop seed may be harvested from such swards at this age, but the swards are more likely to be ploughed without seed being harvested.

Time of Closing Seed Areas

Yields of seed are highest from fields which have not been grazed (for example, on abandoned properties), and where stock are grazed on areas which will be saved for seed they are usually

taken out in October. Sometimes fields are closed as early as September. Closing later than October is likely to be detrimental to seed yield.

Once the seed is set, about February-March, stock are sometimes allowed on the area to graze the bottom, but that is not common.

Time of Harvesting

The maturing of browntop seed, like that of numerous other plants, is rather uneven, and sound judgment is necessary to select the correct stage for harvesting. Flowering is late, most of it occurring during February in Otago and Southland and in late January in Canterbury. Fields of flowering browntop are a pleasing sight, for the

There are many *BIG* things
that can and
few small things that can't be
PACKED BETTER in . . .

BATES MULTIWALL

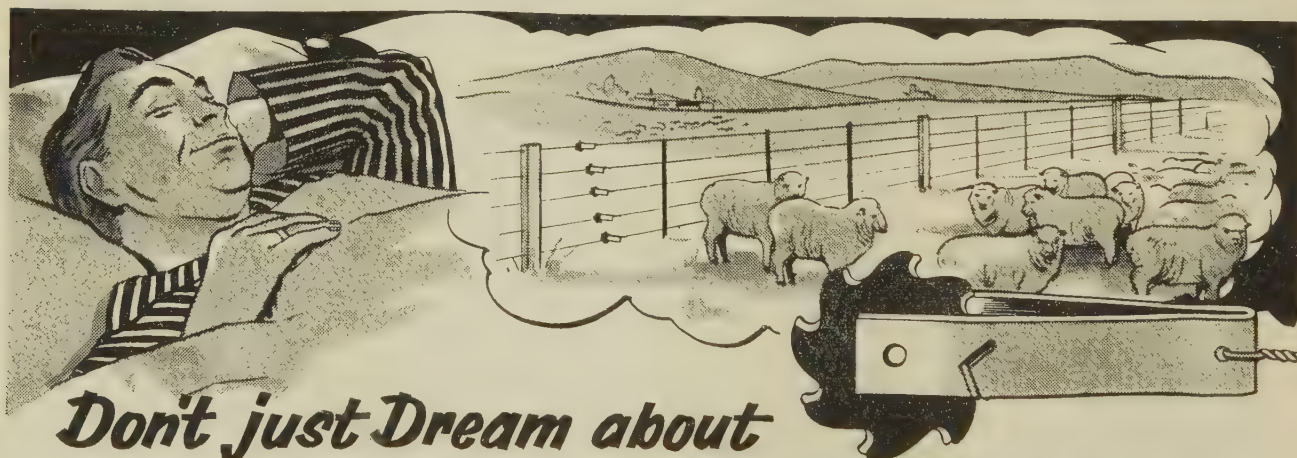
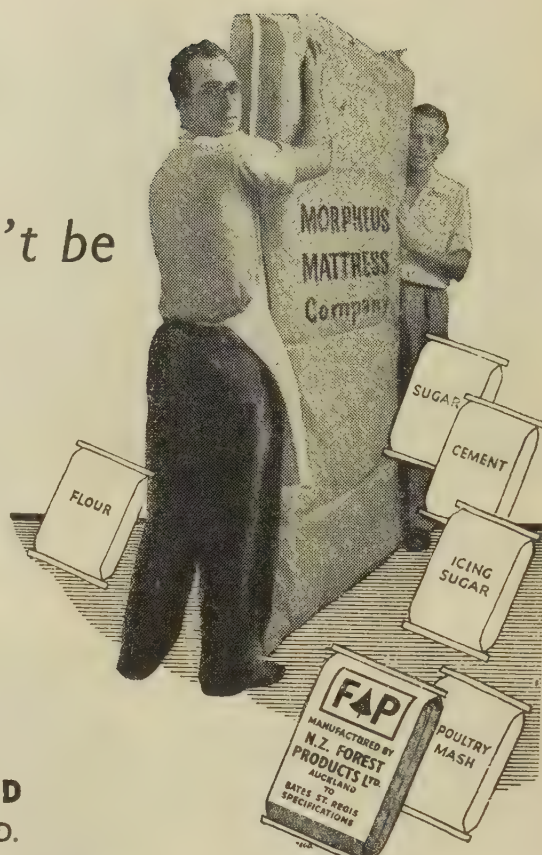
PAPER BAGS

• SIFTPROOF • DIRTPROOF • HYGIENIC

Further particulars from the Manufacturers—

N.Z. FOREST PRODUCTS LIMITED

(MULTIWALL DIVISION) PRIVATE BAG, AUCKLAND.



*Don't just Dream about
Good Fences ... Do Something
about it !!*

HAYES PERMANENT WIRE STRAINERS

Good . . . strong . . . permanent fences are NOT a dream . . . they can be yours for a modest outlay. An efficient fence is an essential part of any farm or property. Hayes Permanent Wire Strainers provide the answer. Sturdily made with heavy galvanised sides, the large, roomy reel holds 8ft. of No. 8 wire and 11ft. of No. 9 wire. Ideal for short or long strains.

HAYES' LABOUR SAVING DEVICES OBTAINABLE FROM

STOCK & STATION AGENTS AND HARDWARE MERCHANTS

Manufactured by ERNEST HAYES (N.Z.) LTD., Templeton, Canterbury.

opened florets and exposed stamens impart a delicate purple tinge to the area.

Seed begins to mature 14 to 21 days after the plants flower, and with the fall of the sap the area appears ashen white. At this stage seed can be rubbed out, and though the bulk of the area may not be ready, harvesting is begun as soon as the completely formed seed appears. As large areas are usually harvested, it is imperative that the harvest begin as soon as the seed is ready so that as the season progresses all seed set is harvested and the best yields are obtained. The risk of loss from winds and other causes would be too great if the start of the harvest were delayed until all the seed was ripe. In South Otago the harvest begins about the middle of March and continues for 6 to 8 weeks, depending on the crop; in some years it has continued well into June.

Older stands are earlier maturing and lower yielding than are younger ones, and consequently they are usually harvested first.

Frosts at flowering time and high winds after the seed is set will lessen the yield. Browntop requires damp conditions for it to thrive, and yields have been high in damp seasons.

In the 1954-55 season rainfall from December to March in South Otago was 10.9in. with 7.46in. of it falling in December and January. That season some 2754 sacks of field-dressed seed were harvested from 9789 acres. In the following year rainfall from December 1955 to March 1956 was only 5.94in. Of this 3.66in. fell in December and January. Only 489 bags of field-dressed seed were obtained from just under 4000 acres. Adequate moisture, particularly during December and January, is therefore all-important for high yields of browntop seed.

If the seed is ripe, no heating will occur unless seeds of catsear are in the sample, when the danger of heating is ever present. These seeds often make it necessary for browntop seed to be run through a drier. By careful adjustment of their headers some experienced harvesters are able to reduce the content of this weed seed to a minimum. These seeds can be dressed out at machine dressing, but seed of another weed, *Juncus bufonius*, is difficult to remove and is the most common impurity in machine-dressed lines.

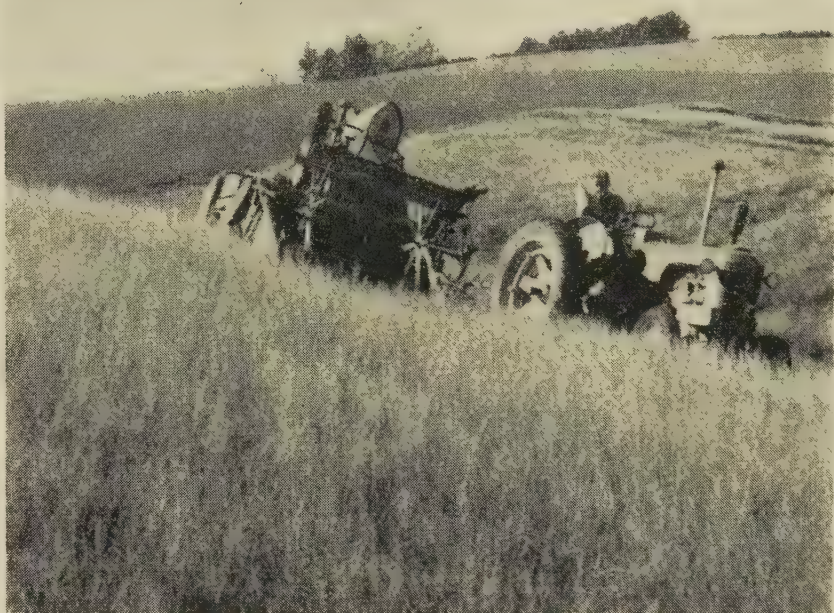
Seed for export requires to be of a very high standard of purity. All seed eligible for certification must reach a minimum purity of 97 per cent. before being sealed and tagged, but most lines reach a purity of 99 per cent.

Harvesting Methods

Implements which have been or are now used in harvesting browntop seed are the reaper and binder, mower, chain drum and beater strippers, and header harvester.

Believed to have been first used in Southland in 1919, the reaper and binder is now out of favour. Great

PRODUCTION OF BROWNTOP SEED



Header harvesters gather most of the browntop seed on the rolling country of South Otago and Southland.

difficulty was experienced with wet sheaves, for once they took up moisture, conditions for good threshing could seldom be obtained. The fine, dense sheaf was bad for holding moisture at the band. To overcome this dampness sheaves were collected on sledges, taken to a central area, and covered to await threshing with a wooden mill. That method proved too expensive for the relatively low yield obtainable. Seven binders operated in one field in 1929, and the material was stooked and then stacked. Because of sweating at the band difficulty was experienced in threshing.

The mower has also gone out of favour, as more efficient means of harvesting are now available.

Chain and Beater Strippers

Excellent samples of seed can be obtained with chain and beater strippers, but whereas 10 to 15 years ago thousands of acres were harvested by this type of machine, they are now used on only a relatively small area. Strippers have been replaced largely by the header and are now operated only on small blocks of 10 to 15 acres or as a follow-up after the header. On small ridges where header operation is unsafe or uneconomic the stripper is useful. One advantage of the stripper is that harvesting can be started earlier in the day than with the header and continued later.

Illustrated on page 11 is a machine made in Balclutha and operating on the chain drum principle. Built for a farmer who has had long experience of harvesting browntop seed, this machine is capable of har-

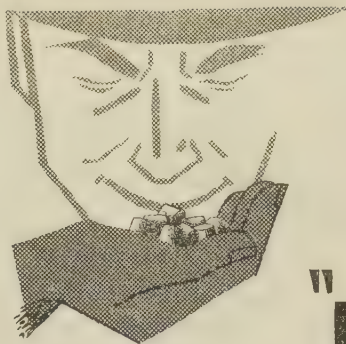
vesting many hundreds of acres a year, and will strip in average going 6 to 8 acres an hour, travelling at from 5 to 7 miles an hour. With this and other strippers the seed harvested contains a considerable quantity of straw, and the material is bagged for screening on the farm or dressing on a modern header. Screens are usually of home construction, made from fine netting which will allow seed to pass through but retain the straw.

In the middle 1930s as many as six strippers would operate in one field, with a set of screens set up in the field to screen out the rough material and bag the seed for dispatch to the machine-dressing plant. The ordinary stripper is a cheap and efficient machine for the harvesting of small acreages, but its efficiency cannot rival that of a header on larger areas. The stripper has almost gone out of manufacture with the growing popularity of the header.

Header Harvesters

The header harvester is rapid and efficient for harvesting browntop seed from large areas, and on its introduction to this type of work in the middle 1930s it quickly found favour, and now most browntop seed is harvested by headers. Seed from the header is sufficiently free from roughage and straw to be sent directly to the machine-dressing plant. That these machines are efficient is shown by the example of one farmer who forwarded 86 sacks of field-dressed seed for dressing and obtained 84 similar sacks of machine-dressed seed.

SMELL
THAT
LINSEED



No mistaking that "Dominion" Stock Pellets are rich in linseed. You can smell it... your stock can taste the nutritious New Zealand grown linseed. "Dominion" Linseed Stock Food is both highly palatable and economical. The pellets are made especially hard for feeding on the ground in all weathers.

RETAIL PRICES

Per ton, freight paid to
nearest railhead
CHRISTCHURCH
and SOUTH **£38**

OTHER SOUTH ISLAND
AREAS **£38-10**

Per ton, ex port
NORTH ISLAND **£39**

Also available:—
"DOMINION"
Genuine Pure Linseed
KIBBLED NUTS

Per ton, freight paid to
nearest railhead or port
CHRISTCHURCH
and SOUTH **£45**

OTHER SOUTH ISLAND
AREAS **£45-15**

Per ton, ex port
NORTH ISLAND **£46-5**

"
DOMINION
BRAND
LINSEED
BASED
Pelleted Stock Food

Both foods available in 125lb. hessian bags from your STOCK and STATION AGENT. Trade enquiries to P.O. Box 2052, Wellington; P.O. Box 1168, Christchurch; P.O. Box 67, Dunedin.

THE LIGHT - WEIGHT CRAWLER
WITH THE HEAVY-WEIGHT PULL

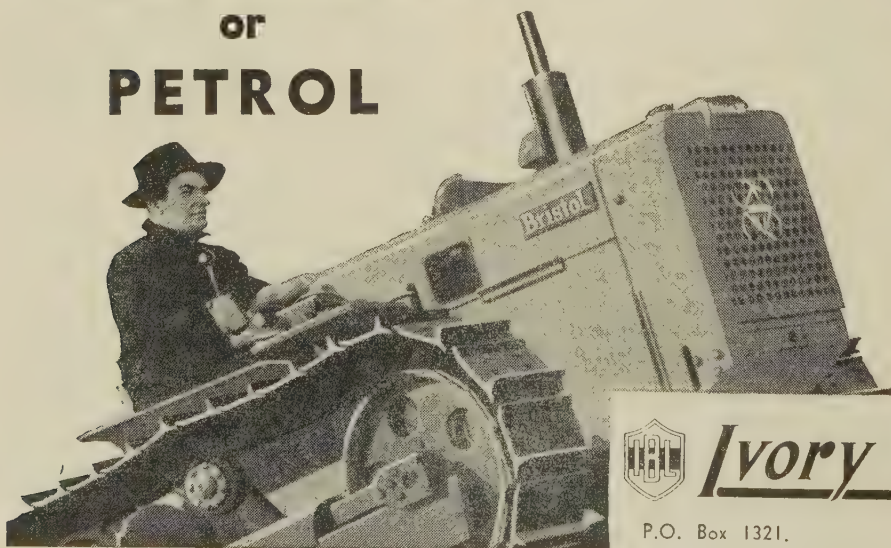
DIESEL

or

PETROL

Bristol
'25'

Safety—Stability—Stamina . . .
Just 3 of the solid reasons why you
can rely on the Bristol 25 for all
types of farm work. You'll quickly
appreciate today's best buy in
light-weight crawlers when you
see the Bristol in action. Full
hydraulic dozer blade too! Also
3 point hydraulic linkage
available!



Ivory Bros. Ltd.

P.O. Box 1321.

WELLINGTON.

There's an Agent in your area for sales and service.

In April and May, when most of the harvesting is done, atmospheric conditions are often damp. Rarely can harvesting be started before 10.30 a.m., and about 3.30 p.m., when the crop again begins to take up moisture, harvesting stops for the day. With the relatively few hours each day when the seed is in condition to be harvested satisfactorily, speed is highly important, and it is here the header finds favour. As the machine is complex, all adjustments must be correct. Particular attention must be paid to the air blast, and for best results the knife, drum, and riddles should be kept full. Ideal conditions for harvesting seed are a bright, sunny day and a light breeze. If the breeze is too strong, irregularities in threshing will occur, especially when the machine is turning across or travelling against the wind. Sound judgment is needed to see that the air blast is adjusted correctly or too much seed will be lost.

With the machine travelling at 4 to 6 miles an hour brushes on the reel are a distinct advantage to sweep the straw away from the knife and give an even feed to the drum. On average rolling country a harvest of 20 acres a day is considered a good coverage for a 12ft. header, though under ideal conditions and on easy country up to 25 acres a day may be harvested. Under such conditions and in a good crop two sacks of field-dressed seed an hour should be obtained.

To be remunerative a crop should yield off the header at least seven sacks of well-filled and well-dressed seed daily.

Contract Harvesting

Most browntop seed is harvested under contract by owners of header harvesters. The contractor carries all costs of harvesting and dressing the seed, and the total proceeds are then divided between the grower and contractor according to a pre-arranged agreement. Rarely is a contract signed. Proceeds are usually shared on a 50-50 basis, but if the crop is heavy, the contractor may receive only 40 per cent., and if it is light, he may receive 60 per cent. This basis appears to be satisfactory to the grower of the seed and the contract harvester.

Usually after the contractor finishes with the crop small isolated ridges remain on which the header has not been able to operate. These areas are frequently harvested by the farmer with a horse-drawn stripper.

Yields

An average yield of browntop seed is very difficult to arrive at. Most paddocks are large, and usually only the better portion of the area is har-

vested. Yields of up to 100lb. per acre have been recorded from small areas, but probably one-third of that yield may be considered as an average over the total area harvested.

At present prices this return is less than can be expected from better utilisation of the areas through liming and topdressing.

Maintenance of Seed Areas

As the great majority of the area on which browntop seed is harvested is capable of carrying better grasses and clovers, the general trend of farming is to reduce and finally eliminate browntop from pastures. Consequently only in special circumstances are efforts made to foster the browntop. Conditions which would favour the encouragement of browntop are present on relatively large farms where it is not possible for the farmer to plough up the amount of run-out pastures that he should each year. As these run-out swards provide little financial return from grazing, efforts are made to make them more productive by encouraging the browntop in the hope that a good seed crop can be taken from them.

Removal of the roughage from these fields by fire in late winter and early spring invigorates the growth of browntop. The burn must be rapid and cool, for if it is too hot, too much bottom is burnt out, and with the coming of the hotter and drier weather the surface of the paddock will dry out. Drying out of the soil at this time of the year is detrimental to the growth of browntop, which demands moist conditions. After a good burn in early spring seed can be harvested in the next autumn. Yields from this type of sward are not very high, but in the following year or two good yields should be obtained.

As well as burning for regeneration the skim plough is sometimes used. The browntop sward is skim ploughed in winter, and by the following February there is a good, vigorous stand of browntop. This method is rarely used now. Such a renewed sward will produce good yields for 3 or 4 years.

Uses of Browntop Seed

The widest use to which browntop is put in New Zealand is its inclusion in seeds mixtures for the sowing out of unploughable hill country. Such land reverts readily to secondary growth such as manuka and fern, and as these lands are difficult to topdress, it is imperative that the seeds mixture sown include a range of species that will cover all fertility levels.

As a lawn grass, especially when sown with chewings fescue, browntop is unsurpassed, and a mixture of these two grasses is now standard for the sowing of croquet lawns, golf greens, and tennis courts, where a fine, even, hard-wearing surface is required.

. . . BROWNTOP SEED

It is usual to sow one part of browntop to two parts of chewings fescue at about 1oz. per square yard.

Seed Certification

A scheme of certification covering browntop seed was inaugurated in 1930-31. Its purpose is to identify lines of seed of typical browntop, free from coarse types and from creeping bent and redtop. Dryland browntop is excluded from the certification scheme.

Only one class of seed is recognised—New Zealand Certified browntop. Any area of browntop of known type is eligible for certification. Before final sealing and tagging machine-dressed seed must reach a minimum purity standard of 97 per cent.

Exports and Prices

For many years the United States took by far the greatest amount of browntop seed, and later the United Kingdom was the chief purchasing country. Australia is now by far the greatest annual importer of New Zealand seed. The bulk of seed shipped is certified.

The price of browntop has been subject to great fluctuations during the past two decades, causing much speculation by farmer and merchant. In recent years the price has varied from 3s. to 4s. per pound. In the 1954-55 season up to 5s. per pound was paid by merchants for machine-dressed Certified seed. In 1934 the price was 1s. 6d.

Undesirable on Good Land

Browntop seed has been harvested in New Zealand for 40 years or more, and during this period many types of *Agrostis* species have been harvested as browntop. Only with the introduction of the Government certification scheme could genuine browntop free from other types be recognised.

In some years browntop seed has given high financial returns, but most of the browntop seed-producing area is ploughable land which by liming, topdressing, and the use of good grass strains is capable of much higher production. High prices for browntop seed during the past few years have tended to keep too much of this land under browntop.

Browntop has a definite place in the farm economy of New Zealand, as it is a most valuable plant on third-class, unploughable land, but its presence on better-class lands, where its incidence is much too high, is undesirable, for such land is capable of much higher production than it now returns under browntop dominance.

Senior Appointments in Extension Division



Mr. Woodcock.



Mr. Saxby.

Mr. J. W. Woodcock, formerly Assistant Director of the Extension Division of the Department of Agriculture, has been appointed Director of the division in succession to Mr. P. W. Smallfield, who was recently appointed Assistant Director-General of Agriculture. Mr. S. H. Saxby has been appointed the new Assistant Director of the division.

Mr. Woodcock joined the Department in 1925 as an Assistant Instructor in Agriculture at Auckland and in 1927 became Instructor in Agriculture there. He served in Taumarunui, Te

Kuiti, and Hamilton. In 1930 Mr. Woodcock was made Assistant Field Crop Experimentalist at Palmerston North and Field Crop Experimentalist at Wellington 5 years later. In 1939 he was appointed Fields Superintendent at Dunedin.

In 1945 Mr. Woodcock was appointed Assistant Director of the Fields Division of the Department, which was reorganised as the present Extension Division in 1948. Mr. Woodcock holds the National Diploma in Agriculture (Leeds).

Mr. Saxby joined the Department as an Assistant Instructor in Agriculture at Dunedin in 1936, and the next year was made Instructor in Agriculture there. He came to Wellington in 1945 as Agrostologist.

Mr. Saxby was for several years the secretary of the New Zealand Grassland Association and is the present president of the association. He has been largely responsible for the great increase in membership and widening of interest in the association. He is the author of "Pasture Production in New Zealand", which has had several editions over the last 10 years and which is regarded as a standard work on pasture establishment and management in New Zealand.

Mr. Saxby was organising secretary for the Seventh International Grassland Congress held in Palmerston North last year.

Loss of Sulphur in Drainage Water

THE incidence of sulphur deficiency in certain New Zealand soils has given special interest to losses of sulphur as sulphate in the drainage water from lysimeters at the Department of Agriculture's Rukuhia Soil Research Station, Hamilton.

Figures available for the past 3 years have been calculated as pounds of sulphur lost per acre. This was from pasture not topped since 1947. The figures are as follows:—

	Sulphur lost lb.	Superphosphate equivalent* lb.	Annual rainfall in.
1954 ..	14	140	48
1955 ..	11	110	42
1956 ..	26	260	68

* Figures in this column are superphosphate equivalents in terms of sulphur of figures under "Sulphur lost".

Superphosphate contains about 10 per cent. of sulphur.

Losses of this order have been reported by overseas workers. A true assessment of actual sulphur lost cannot be made until preparations are completed to measure precipitation of atmospheric sulphur derived from sea spray and combustion of fuel (wood, coal, and mineral oils). The concentration of sulphur in the drainage water does not vary greatly, so that total loss is related to rainfall.

It seems probable that atmospheric sulphur gained could balance losses in years of low or normal rainfall. The record rainfall of 1956 almost certainly would cause a net loss of sulphur.

—D. F. WATERS.

Senior Agricultural Chemist,
Department of Agriculture,
Hamilton

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during April 1957 and for the 9 months ended 30 April 1957 with comparative figures for the same month and 9 months of 1955-56 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
April 1957 ..	8,787	228	9,015	—
April 1956 ..	7,310	210	7,520	—
Increase or decrease ..	+1,477	+18	+1,495	+19.880
9 months ended 30/4/57 ..	147,934	2,743	150,677	—
9 months ended 30/4/56 ..	155,538	2,779	158,317	—
Increase or decrease ..	—7,604	—36	—7,640	—4.826

Butter in store at 30 April 1957 was 27,400 tons

Note: In the 3 months January-March 3990 tons of ice cream base were graded for export at Auckland, but not included in the butterfat figures.

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
April 1957 ..	5,978	722	6,700	—
April 1956 ..	5,630	881	6,511	—
Increase or decrease ..	+348	—159	+189	+2.903
9 months ended 30/4/57 ..	74,155	9,978	84,133	—
9 months ended 30/4/56 ..	72,467	12,702	85,169	—
Increase or decrease ..	+1,688	—2,724	—1,036	—1.216

Cheese in store at 30 April 1957 was 25,201 tons

If these figures are converted into butterfat equivalent, there is a decrease of 4.122 per cent. in butterfat graded for the 9 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.



Trees on the Farm

Trees Suitable for Canterbury

BECAUSE requests are often received for names of trees suitable for certain localities, lists are being compiled by district officers of the New Zealand Forest Service. This list for Canterbury, by W. H. Jolliffe, Extension Forestry Officer, New Zealand Forest Service, is the fourth in this series, the others having appeared in the February, April, and June issues of the "Journal".

FOR the purposes of this article Canterbury can be divided roughly into four zones, the coastal lands, the dry plains, the foothills with most of South Canterbury, and the high country.

Coastal Lands

Trees which will withstand salt-laden winds on coastal lands are macrocarpa, radiata pine, and maritime pine (*Pinus pinaster*) in order of preference.

Dry Plains

On the dry plains conditions are difficult. Rainfall is low, about 25in.

a year, and soils are frequently stony with an underlying hard pan. A further complication is the hot, dry north-westerly winds which occasionally reach gale force and cause extensive blow-downs among tall stands. Such a combination of difficult site factors requires careful choice of species.

Radiata pine will grow anywhere in Canterbury, but on the shallow, stony soils it is liable, owing to its rapid height growth, to be blown down or

have its top broken off before reaching maturity. It is, however, quite feasible to grow it in pure stands on a shorter rotation (that is, harvest the stands before they reach full maturity) or in a mixture with some more wind-firm species. Wind firmness can be assisted by early and regular thinnings in the stand.

Other tree species which are doing well on these stony soils are as follows:—

Arizona cypress (*Cupressus arizonica*) is an excellent shelter tree, but its timber value in New Zealand is as yet unknown.

Cedars (*Cedrus deodara* and *C. atlantica*) will give good shelter, especially the former. These trees have durable heartwood and they provide good general-purpose timber in their native countries, but their timber is not yet well known in New Zealand.

Corsican pine (*Pinus laricio*) is slow growing but produces a useful, dense softwood which, however, is not durable untreated.

Eucalypts: Of this big group probably *Eucalyptus obliqua*, *E. macarthurii*, and *E. viminalis* are best suited to the plains. They are quick growing, but their timber is not very durable.

Robinia is a deciduous, leguminous tree which produces a durable timber fairly quickly (in about 15 years).

She oak (*Casuarina* sp.) gives some shelter. The timber is not durable, but makes good firewood.

Foothills

In the foothills and in most of South Canterbury conditions are much more favourable for tree growth. Rainfall is adequate (30in. to 60in. a year) and well spread throughout the year, and frosts, though sometimes heavy, occur mostly when tree growth is dormant. In this zone all trees that will tolerate a fair degree of frost will grow, and of the species commonly used in New Zealand this excludes only the southern pines, such as *Pinus caribaea*, and many of the eucalypts.

Some species are so much at home here that they regenerate freely from seed falling from parent trees. These include Corsican pine, Douglas fir, larch, muricata pine (blue variety), Scots pine, and a silver fir (*Abies grandis*).

High Country

In the high country the range of possible species is restricted by site peculiarities to such hardy ones as larch, *Pinus ponderosa*, *P. murrayana*, *P. muricata*, Sitka spruce (in moist or at least misty sites), poplars, European birch, and rowan.

This zone also is well suited to some of the native beeches (*Nothofagus* spp.). They will even regenerate naturally from seed falling near parent trees provided stock is fenced out.

HEADING PHOTOGRAPH: Deodar cedars on dry, stony ground north of Ashburton.



BLACKLEG AND PULPY KIDNEY IN EWES AND LAMBS

**Vaccination is the most
economical and certain
method of prevention**

Losses from blackleg in lambing ewes and their lambs up to 6 weeks of age can be greatly reduced by vaccination of ewes two to three weeks before lambing.

Ensure maximum protection to ewes and lambs by vaccinating with

**TVL COMBINED BLACKLEG-
PULPY KIDNEY VACCINE**



TVL

TASMAN VACCINE LABORATORY LIMITED

P.O. BOX 29, UPPER HUTT

Recent Research Work



TUSOCK GRASSLAND

THE Extension Division has now under observation 130 trials on tussock grassland improvement. The trials cover oversowing and topdressing, methods of establishment, plant introduction, seed production, and grazing management. The Division's earlier trials were mainly plant introduction studies in which were tested a large number of species of grasses and legumes considered likely to establish and persist in tussock grassland in its existing state. In recent experiments more prominence has been given to trials which compare establishment methods and the effects of improving soil fertility by the introduction of legumes and the application of phosphatic fertilisers. Information is being accumulated slowly on what are the useful species, what species are promising and warrant further testing, the best methods of sowing, the value of fertilisers and legumes, and the changes in the botanical composition of the sward brought about by spelling, oversowing, and burning.

USEFUL GRASSES

COCKSFOOT has proved to be one of the best grasses for cover, production, and palatable feed on ploughable and unploughable country. It has been productive even in the drier areas and has survived droughts and frosts. It becomes frosted during winter, but not as severely as some of the other grasses.

Bromus inermis and tall oat grass, especially the Tualatin strain, are valuable grasses for providing cover, but are not as productive as cocksfoot, and the palatability of tall oat grass is only fair. Both become frosted in winter, particularly *Bromus inermis*. It is suspected that in a trial at Alexandra the seed setting of *Bromus inermis* was affected by late frosts that occurred when it was flowering.

USEFUL LEGUMES

Lucerne is the most valuable legume on the dry cultivable country. Establishment of it from oversowing usually has not been satisfactory. Lucerne is one of the first species to start growing in spring and is the quickest to recover in autumn after rain.

Red, white, and alsike clovers are the most useful clover species. Subterranean clover has performed well in some

areas, particularly on ploughed land. Zig-zag clover has shown that it is persistent, even under dry conditions and set stocking, but it establishes and spreads slowly. It is likely to be of greatest value under the driest and coldest conditions, where white, red, and alsike clovers do not persist. Further detailed trial work is to be undertaken with various strains of these useful species, as it is possible that more suitable strains could be found for extreme conditions of drought and cold.

METHODS OF SOWING

On the driest areas improved establishment of legumes has been obtained by drilling the seed into the sward with special tips or sod seeders. However, clovers can be successfully established on steep country by surface seeding, as demonstrated on a large scale by aerial oversowing.

Grass species are difficult to establish by oversowing or overdrilling, and poor results have been obtained with these methods, except where the sward is very open. If the existing sward is dense and competitive, it usually has to be killed before a good strike of oversown grasses is obtained. Pre-treatment with chemical weedkillers is likely to assist the establishment of oversown grasses by removing or temporarily suppressing the existing vegetation.

OVERSOWING AND TOPDRESSING

Recent work has shown that not enough emphasis has been placed on the importance of fertiliser and the value of legumes in tussock country. Oversowing of clovers and the application of superphosphate have resulted in a big improvement in cover and production of tussock grassland within a few years on a wide range of country. This improvement is more rapid on country that receives 25in. or more of rain per annum, but even on the dry, sunny faces there is a gradual increase in density of clover plants. One trial on a grub-damaged area, where the tussocks appeared dead, showed that this area could recover within 4 years when clovers were introduced with adequate phosphate. The tussock species grow more vigorously in association with clovers and are not choked out by competition from the clovers. In exposed areas tussocks provide shelter for the young, establishing plants.

INOCULATION OF CLOVERS

Often the initial strike of clovers is good, but later they survive only in patches. It is suspected that in some cases insufficient effective *Rhizobia* (root-nodule bacteria) are present in the soil. Inoculated clover seed has given better establishment than untreated seed in several trials, and further trial work will be conducted to determine more accurately the role of inoculants in aiding clover establishment in tussock country. Even in areas where clover eventually establishes successfully inoculation may help the clovers in the early stages. This would be of importance under critical seasonal conditions.

OTHER STUDIES

Problems of subdivision of the land, utilisation of the extra feed, and management require to be studied once the areas that respond to oversowing and topdressing have been defined. A start has been made in examining the effects of different rates of fertiliser and of applying trace elements.

Studies are being made to obtain precise knowledge of changes in species composition of the sward under various forms of management. The effect of burning on species composition is a major project being undertaken. Last year preliminary work was done to determine the best method of botanical analysis to use for measuring the effects of repeated burning, infrequent burning, and rate of recovery from burning on snowgrass and hard fescue dominant associations over 10 years.

—SHONA M. MACLEAN

Identification and Control of Rushes



THOUGH there are 29 species of rushes in New Zealand, only 6 species can be considered to be serious weeds of established pastures. These are *Juncus pallidus*, *J. effusus*, *J. polyanthemus*, *J. pauciflorus*, *J. luxurians*, and *J. vaginatus*. They are all erect-growing rushes, ranging in height from 9in. for a small specimen of *J. pauciflorus* to 7ft. or more for a large specimen of *J. pallidus*. In this article by L. J. Matthews, Weeds Research Officer, and D. I. Glue, Instructor in Agriculture, both Department of Agriculture, Wellington, they will be referred to collectively as the "pasture rushes".

IT may surprise some people that rushes can be regarded as serious weeds of established pastures, as there is a common misconception that they grow only on swampy areas. Though almost all rushes thrive in waterlogged conditions, the 6 species listed above also grow well in conditions of soil moisture and fertility which are ideal for the growth of high-producing pastures. They can also grow in conditions which are much drier than this, as is demonstrated by the fact that they are sometimes found on sand country and on dry, northerly hill faces.

Any conditions which lead to the opening of the sward, such as summer drought or winter poaching, allow rushes to invade the pasture, and, as they are perennial plants and well adapted to survive under grazing, they can be extremely difficult to get rid of. With the use of hormone weedkillers, however, plus the adoption of pasture management practices to ensure the maintenance of a vigorous and close-knit sward, the pasture rushes can be quickly eliminated, except where conditions are too wet for the better-producing species of pasture plants.

Though a number of low-growing rushes, principally *J. bufonius* and *J. articulatus*, appear in newly established pastures before the sward has had time to thicken up, they do not persist into the pasture's life unless soil conditions are too moist to be suitable for the growth of high-producing pastures.

Susceptibility to Weedkillers

Rushes vary widely in their susceptibility to hormone weedkillers. For

example, *J. effusus* and *J. pallidus* can be readily controlled, but *J. vaginatus* is fairly resistant. Farmers are often puzzled by the excellent results obtained from spraying rushes in one pasture and the poor control obtained in adjacent ones. This variation in results is often due to the different species of rushes present.

For this reason it is important to identify the rushes present before spraying. The best time to do this is when the rushes are growing freshly in the field, as identification becomes much more difficult once they have wilted.

IDENTIFICATION

The following are the main points used when identifying rushes in the field:—

1. Pith Continuous or Interrupted

If the stem of a rush is split along its length with a razor blade or sharp knife, the split stem in some species will be found to be filled with a continuous white pith and in others with pith that is not continuous but is interrupted with numerous regularly occurring air spaces. In *J. vaginatus* there are often so many air spaces that the pith is virtually lacking, being reduced to small remnants clinging to the inside of the stem walls. As a result this rush appears to have a hollow stem.

Identification by the study of pith in the stem can be made satisfactorily only with stems of mature rushes which are carrying flower heads or seed capsules. Undamaged stems should be selected, as the attacks of caterpillars can greatly modify the pith characteristics.

2. Stem Colour

When healthy pasture rushes in vigorous growth are viewed with the sun behind the observer some species are seen to have smooth, shiny green stems and others much duller stems of a bluish green. Closer examination will show that the shiny green rushes have very faint parallel striations (fine longitudinal lines) down the stems, whereas the striations on the stems of the bluish green species are much more distinct.

3. Size and Length of Capsules

All rushes have 3-valved seed capsules, that is, 3 scale-like leaves have joined their margins together to form a hollow capsule, within which the seeds, which are extremely small, are lying free. These 3-valved capsules, each containing numerous tiny seeds, are a characteristic of all *Juncus* species. They are a useful aid in distinguishing rushes from other plants, such as sedges, with which they are often confused. Sedges and other members of the *Cyperaceae* family have relatively large seeds which occur singly or in clusters, but never lying loose in 3-valved capsules.

Each capsule is held round the base by six perianth segments, which form a little cup. (The perianth is the outer part of a flower.) In some species, notably *J. pallidus*, the capsules are very large and so long that their tops project well past the tips of the perianth segments. In other species, such as *J. luxurians*, the capsules are equal to or shorter than the perianth segments.

4. Head Characteristics

The capsules are grouped into clusters called heads or inflorescences. The shape, general appearance, and number of capsules in each head provide valuable identification features. In some species, for example *J. vaginatus*, the heads are tightly clustered spherically; others, for example *J. luxurians*, have a large number of capsules in very loose, spreading heads.

Farm Identification Procedure

The following procedure is recommended for identifying rushes on the farm:—

First, select a mature undamaged stem bearing flower heads or seed capsules. Split it along its length with a razor blade or sharp knife and examine the pith.

Rushes with Continuous Pith

If the pith is continuous, the rush is *J. pallidus*, *J. effusus*, or the solid-pith strain of *J. polyanthemus*. Detailed identification points for these three species are as follow:—

J. pallidus

J. pallidus is the largest of the pasture rushes, sometimes being more

than 7ft. high. The stems are extremely thick and are shiny green with faint parallel striations. In relation to their thickness the stems are fairly soft and easily broken, but they are not nearly as soft as those of *J. effusus*. *J. pallidus* occurs in broad-based clumps which contain relatively few stems. Many of the stems, particularly the outside ones, bend over toward the ground. The capsules are very large and project well past the perianth segments. They are tightly grouped into large spherical clusters.

J. effusus

The stems of *J. effusus* are a good deal shorter than those of *J. pallidus*, being rarely longer than 4ft. 6in. They are also much thinner than those of *J. pallidus*, though owing to their reduced height, they appear fairly plump. The stems are shiny green with faint parallel striations. They are very tender and can be snapped easily with the hand. The softness of the stems is a remarkably good identification feature, and the breaking test is the quickest way of verifying the identity of this rush. Possibly owing to its softness, it is frequently hard grazed by all classes of stock.

IDENTIFICATION OF RUSHES

The stems are loosely arranged in their clumps and though they often bend outward from ground level, they do not droop, but keep straight along their length. The capsules are fairly small and do not project past the perianth segments. The bottom branchlets of each head cluster always bend toward the ground. Often the capsules are undeveloped and persist unchanged throughout winter, giving the flower heads a characteristic feathery look. There are numerous capsules in each cluster and the clusters are usually fairly loose.

J. polyanthemus (Solid-pith Form)

J. polyanthemus (in either the solid- or interrupted-pith form) is the most widely distributed and abundant rush in New Zealand, and as a species it is fairly variable. Some forms have continuous pith, but the pith is more commonly interrupted. Both types of pith have been known to occur on adjoining stems on the same plant.

The stems are shiny green and extremely tough and wiry. This rush is probably the hardest of all to break. Owing to their stiffness, the stems usually do not droop, even when



Pith structure of rushes. Left to right—*J. pallidus*, *J. effusus*, *J. polyanthemus* (solid-pith form), *J. polyanthemus* (interrupted-pith form), *J. pauciflorus*, *J. luxurians*, and *J. vaginatus*.

Common Pasture Rushes

J. effusus



J. luxurians



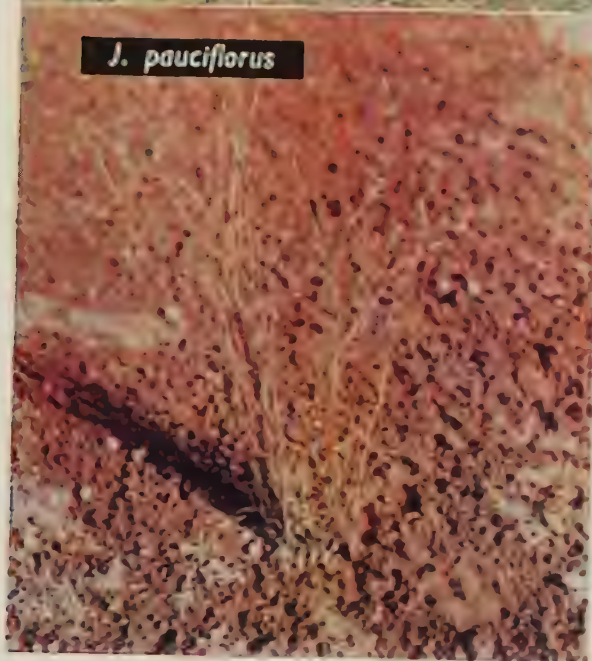
J. pallidus



J. vaginatus



J. pauciflorus



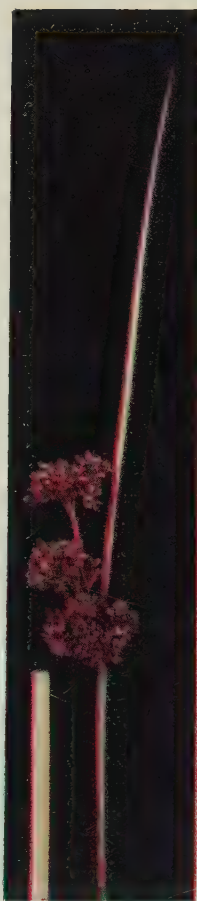
J. polyanthemus



Seed Heads and Pith Structure



Interrupted-pith rushes. Left—*J. luxurians*. Middle—*J. vaginatus*. Right—*J. polyanthemos* (interrupted-pith form).



3-valved capsule

Perianth segments

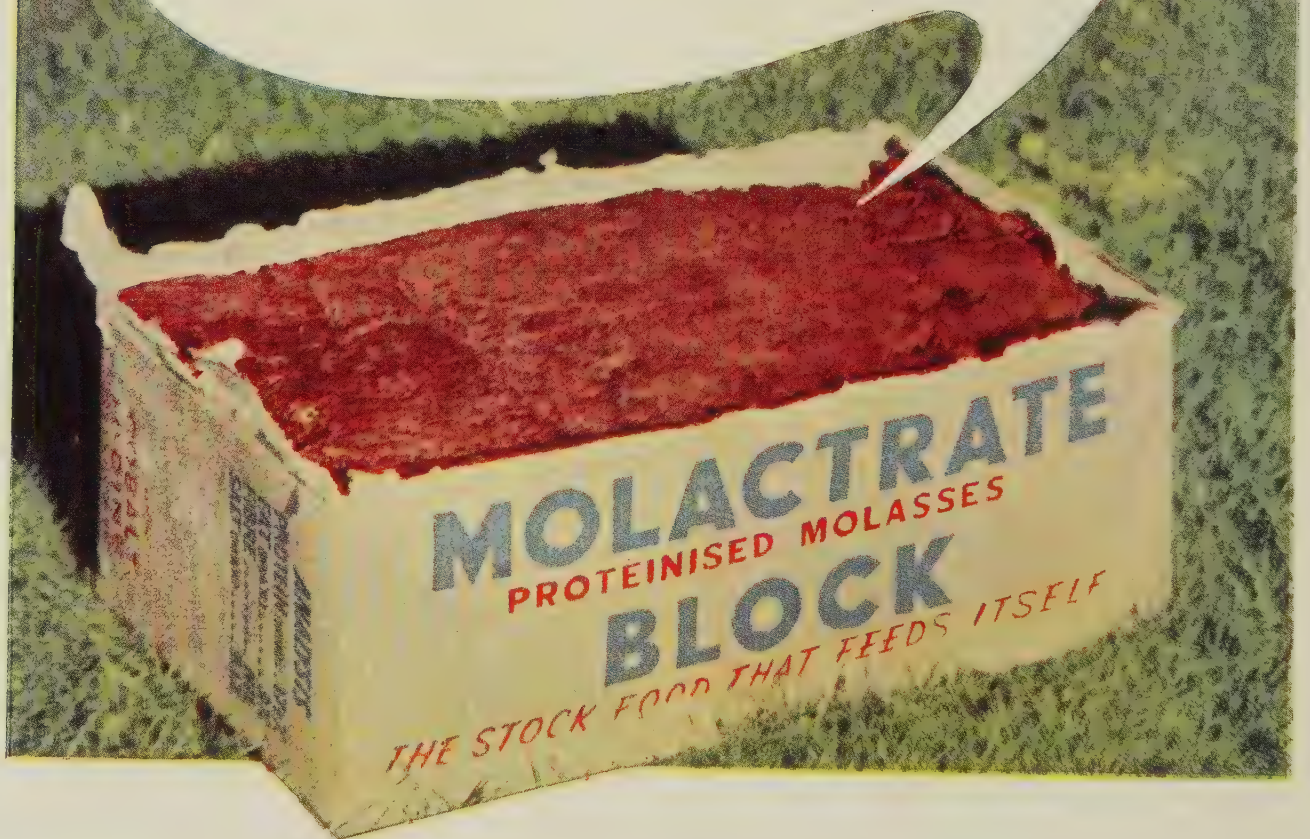


Seed Head

Continuous-pith rushes. Left—*J. polyanthemos* (solid-pith form). Middle—*J. effusus*. Right—*J. pallidus*.

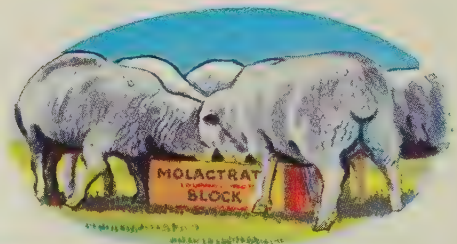
The perfect food to prevent 'Sleepy Sickness'

Feed for 6 weeks before Lambing



*Just put it out in the paddock—
your stock do the rest!*

SLEEPY SICKNESS, remember, is a nutritional disease of the ewe. You can guard completely against losses by proper feeding at the right time. Feed Molactrate Block to your ewes for 6 weeks before lambing. Hundreds and hundreds of farmers, once periodically plagued with 'twin-lamb disease', now, thanks to Molactrate feeding, never lose a lamb. Now is the time to both think and act—order from your Produce Merchant or Stock and Station Agent today.



leaning out from the rush clump, though very tall specimens may droop a little at the tips.

The capsules are about the same length as the calyx lobes or slightly longer, and they are always distinctly smaller than those of *J. pauciflorus*. Some heads contain few capsules in small, tight clusters, but others have numerous capsules in loose clusters.

Though this species is fairly variable, it is easily distinguished in all its forms from either *J. pallidus*, which is much taller and thicker, or *J. effusus*, which is much softer and is easily broken.

Rushes with Interrupted Pith

If the rush has interrupted pith or the pith is virtually lacking, it is either *J. polyanthemus* (interrupted-pith form), *J. pauciflorus*, *J. luxurians*, or *J. vaginatus*. Detailed identification points for these species are as follows:—

J. polyanthemus (Interrupted-pith Form)

The interrupted-pith form of *J. polyanthemus* is identical with the solid-pith form except that there are large, ragged air spaces in the pith.

Little difficulty is experienced in distinguishing *J. polyanthemus* from the other three rushes with interrupted pith. The obvious differences between *J. polyanthemus* and *J. pauciflorus* are given in the description of the latter which follows. *J. luxurians* and *J. vaginatus* have bluish green stems which are not shiny.

J. pauciflorus

J. pauciflorus is the smallest of all the pasture rushes, ranging from 9in. to 2ft. high. It is not common in the North Island, but occurs fairly frequently in the South Island, usually in swards of low carrying capacity, such as on tussock country or dry, sandy soils. In appearance it resembles an extremely small and slender form of *J. polyanthemus*, but with the following differences:—

There are few stems and, though they resemble *J. polyanthemus* in being smooth with faint striations, they differ in that they are usually not green and shiny, but tend to be reddish brown. Though the stems are short, they are so thin that they cannot stand erect, but droop at the tips. The air spaces in the pith of *J. polyanthemus* are large and irregular in shape and distribution, but in *J. pauciflorus* they are very small, uniform in shape, and are regularly spaced, the general effect being of a row of tiny, neat dots running up the pith. The pith cavity is very narrow, being only a third as wide as the external diameter of the stem, compared with half as wide in *J. polyanthemus*.

There are few capsules ("pauciflorus" means "few flowers"), but they are very large in relation to the size of the small plant. They project

markedly past the perianth segments. The heads are compactly grouped and each head usually contains not more than 6 capsules. *J. pauciflorus* is the least important of the pasture rushes and it is doubtful whether eradication of it with hormone weedkillers is warranted in the types of pasture where this rush is usually found.

J. luxurians

J. luxurians is a tall rush with dull bluish green stems with strongly marked parallel striations running along them. The stems grow very close together forming thick clumps, and the outside stems in particular tend to bend over toward the ground. The infertile stems (those which are not bearing flower heads or seed capsules) tend usually to have a much more bluish tinge than the fertile stems. The capsules are quite small and are never longer than the perianth segments. The capsules, which are very numerous, are crowded together into very loose, wide-spreading clusters. An important identification feature is that the continuation of each main stem past the clusters of capsules is very much longer than in any other rush, sometimes being more than 1ft. long.

J. vaginatus

The stems of *J. vaginatus* are a dull bluish green with strongly marked parallel striations, but unlike those of *J. luxurians* the sterile stems are not more bluish than the fertile stems. This rush does not usually grow very tall (rarely more than 3ft. high) and the stems are fairly thick and loosely packed, forming open clumps.

Stems always contain little pith and sometimes hardly any, the latter stems appearing to be hollow. Stock will often hard graze this rush. The seed capsules are large and usually about as long as the perianth segments, though sometimes slightly longer. The capsules are crowded into tight, spherical clusters sometimes only one per stem and sometimes five or six.

CONTROL

Rushes are more difficult to control with chemical weedkillers than highly susceptible weeds such as buttercups and annual thistles. This is due largely to the fact that buttercups and annual thistles have a bigger surface area to catch the spray than rushes. Because rushes are difficult to wet with spray, extra care is required if good results are to be obtained. Provided the following rules are followed carefully, good control of susceptible species of rushes can be expected.

1. Identify the rush or rushes present: *J. effusus* and *J. pallidus* are the most susceptible species, *J. polyanthemus* and *J. luxurians* are inter-

... CONTROL OF PASTURE RUSHES

mediate in tolerance, and *J. vaginatus* is fairly resistant. Poor control is usually obtained if *J. vaginatus* is sprayed.

2. Always use an oil-soluble ester of 2,4-D: In trial work water-soluble salts of 2,4-D have given excellent control of susceptible species such as *J. effusus*, but in practice this treatment has not been reliable, because at least 3 days' fine weather is required before the material is fully absorbed. The outer layer of a rush is often thick and relatively waterproof and can be penetrated best by oil-soluble esters. These should be applied at 2lb. acid equivalent per acre.

3. Always use an atomised spray: Rushes should preferably be sprayed in the early morning or late evening, when the weather is calm, so that the spray particles may be atomised or fogged as much as possible. If 32 fan-type nozzles are used at pressures of 35lb. to 40lb. per square inch, a fine spray will be obtained that will adhere to the upright rush stems; coarse spray particles fail to cling to the rush stems. For spraying rushes the boom should preferably be covered so that the fine spray falls largely on the target and little is lost through wind drift. Spraying from two directions is recommended, 1lb. acid equivalent per acre of an oil-soluble ester of 2,4-D being applied in each direction.

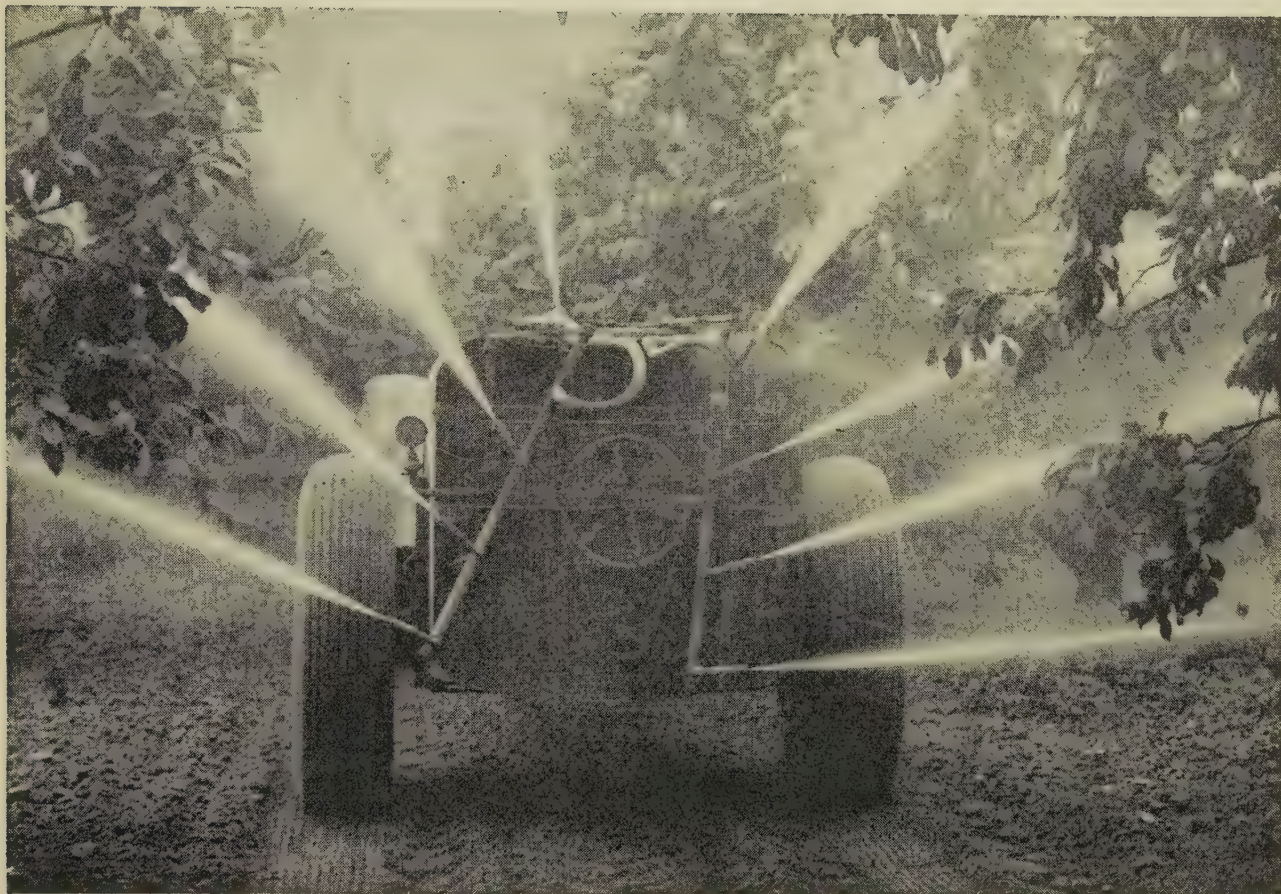
4. Always spray seedling rushes or rush regrowth: All species of rushes are probably susceptible at the seedling stage. Mature rushes, particularly the more resistant species, require prior cutting. The rushes should be cut in spring and sprayed when the regrowths are 12in. to 18in. high and before the onset of dry weather. For susceptible species, such as *J. effusus* and *J. pallidus*, prior hard grazing is an alternative to mowing. The regrowths after grazing should also be sprayed when 12in. to 18in. high.

5. Always follow up spraying with good pasture management: The oil-soluble esters of 2,4-D applied at 2lb. acid equivalent per acre are particularly severe on clovers, which may be checked for several months. Every endeavour should be made to encourage the clovers after such an application by topdressing and preferential grazing management where practicable. If this is not done, the area will usually revert strongly to rushes after several years. Spraying of rushes should always be followed by pasture improvement, as chemicals have only the power of controlling the rushes present at the time of spraying. They have no control over a subsequent invasion of rushes. These can be kept out only by improvement of pastures.



Automatic Spraying Equipment in Hawke's Bay Orchards

DURING the last 5 years the New Zealand orchardist has seen some amazing progress in fruit growing techniques. The control of diseases and pests is one extremely important aspect of fruit culture which is time consuming and costly. In this respect the orchardist's job has been made much easier by recent introductions of automatic spraying equipment. An outline of the various types of machines and the degree to which automatic spraying has advanced in Hawke's Bay is given in this article by N. B. Congdon, Instructor in Horticulture, Department of Agriculture, Hastings.



FIFTEEN years ago spraying was done almost entirely by hand. Many orchards were permanently piped, with the pump and spray vat located in a shed. Hoses were coupled to taps placed at regular intervals throughout the orchard and operators sprayed the surrounding trees before moving on to the next tap. These were known as stationary outfits and proved efficient, though very tedious and time consuming. Portable sprayers with two men spraying from the ground with long hoses were also popular.

A later development, particularly on larger properties, was the use of "crawler" outfits, requiring usually three men—two spraying from platforms on the back of the unit and one man driving the sprayer at a slow, steady speed between the trees. With this system it was possible to cover up to 10 acres in an 8-hour day, but though spraying was done faster with

a high degree of efficiency, the need for three men was an important consideration.

Reasons for Change-over

High labour costs and the scarcity of suitable labour in recent years have forced many growers to adopt more economic systems. This has been made possible only with the introduction of a range of automatic sprayers or, alternatively, conversion units suitable for attaching to existing machines. One operator can now spray an orchard in a quarter of the time required previously and in a more pleasant and convenient manner. This has facilitated more frequent spray application during critical periods of disease or insect attack.

Apart from the labour factor, some new machines are also saving material by being able to cover fruit and foliage adequately with less material per acre and also maintain efficiency.

The level ground of most orchards is suited to automatic sprayers, which require constant and uniform speed of travel for best efficiency.

Types of Sprayers

Nowadays the terms "dilute" and "semi-concentrate" spraying are used.

▲ The "Low Boy" automatic unit with oscillating arms. Many units of this type and the type shown in the upper illustration on the opposite page are being converted to airblast spraying by the addition of an airblast attachment.

Sometimes the alternatives "high volume" and "low volume" are used.

Dilute or High-volume Spraying

In dilute or high-volume spraying materials are applied at normal dilution. Fruit trees are sprayed to that point of saturation when the beginning of drip or run-off indicates satisfactory coverage. Two main types of dilute automatic machines are used in Hawke's Bay.

High-pressure machines with oscillating arms: The accompanying photographs illustrate the design and operation of these outfits. The standard "Low Boy" unit shown on this page consists of a pair of arms each with four nozzles set at the rear of the spray tank. The arms are rocked from side to side by a central pulley driven from the agitator shaft. A high-pressure pump operating at up to 600lb. per square inch and the rocking or oscillating motion of the nozzles provide the necessary output and coverage.

← Upper—A locally developed automatic unit with overhead fixed nozzles and lower oscillating brooms. Lower—An airblast sprayer attachment in operation. This type of machine is proving popular in Hawke's Bay orchards, where half of the spraying is now done by airblast equipment.

WORLD CIRCLE TOURS

(FORMERLY WHITE CIRCLE WORLD TOURS)

Offer *YOU* a Variety of ROUND-THE-WORLD Tours

including

TOUR No. 1143

AND

TOUR No. 1145

(APPROX. MARCH TO OCTOBER)

1958

(APPROX. MAY TO NOVEMBER)

EACH TOUR:

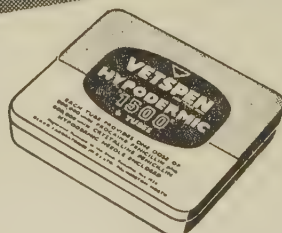
- | | | |
|--|---|---|
| <p>1. VISITS THE 3 GREAT CENTRES OF THE WESTERN WORLD: NEW YORK, LONDON and PARIS.</p> <p>2. PROVIDES SHIPBOARD RELAXATION ON 3 VAST OCEANS.</p> <p>3. TRAVERSES NORTH AMERICA: including Canada and the Rockies, Niagara Falls, Washington, Chicago.</p> |  | <p>4. SPREADS THE MAGIC CARPET IN GREAT BRITAIN; LAND'S END TO JOHN O' GROATS.</p> <p>5. TAKES IN THE CULTURAL AND SCENIC ATTRACTIONS IN SEVEN COUNTRIES ON THE CONTINENT.</p> <p>6. AND RETURNS HOME VIA SUEZ AND AUSTRALIAN PORTS.</p> |
|--|---|---|

PERSONALLY CONDUCTED THROUGHOUT — GOOD HOTELS — THE BEST BY MODERN TOURIST STANDARDS — **COST £930 PER PERSON!**

IN **3** STRENGTHS

100 
500 
1500 

VETSPEN
Regd. Trade Mark
hypodermic
PENICILLIN INJECTION
FOR LARGE and SMALL ANIMALS



Vetspen Hypodermic provides an economical and convenient way of preventing and curing penicillin-sensitive infections in farm stock. It contains both crystalline and procaine penicillin; this combination gives the high level of penicillin necessary to control rapidly developing infection and the prolonged antibacterial action needed to eradicate established infection. By using the appropriate strength of Vetspen Hypodermic, a farmer can give penicillin treatment to his stock quickly and without the inconvenience of frequent injections.

GLAXO LABORATORIES (N.Z.) LTD.,



PALMERSTON NORTH

Other locally made sprayers of similar type are also being used with good results. The most prominent of these is the "Boyce" automatic outfit shown in the upper illustration on page 26. The essential difference between this and the "Low Boy" type is the use of an overhead boom with fixed arms each with a series of nozzles. A pair of oscillating arms working low apply spray to lower parts of the tree. This machine was so designed to ensure adequate coverage of the generally large fruit trees of Hawke's Bay, and in this respect has proved effective and popular among local growers.

This type of dilute sprayer is now giving way to more up-to-date airblast equipment. Though both types are automatic, there are two distinct advantages in this change-over.

First, airblast sprayers can operate more satisfactorily in windy conditions. Growers have experienced erratic coverage by oscillating-arm action in any degree of wind, which often interrupts the normally steady spray outflow to the tree.

Secondly, though with conversion to airblast spraying there is no saving in labour, there is generally a significant saving in spray material because less is required per acre than with oscillating-arm equipment. The only disadvantage with an airblast attachment is that an extra motor is required to drive the fan, which therefore increases petrol cost.

. . . SPRAYING IN HAWKE'S BAY ORCHARDS

Oscillating-arm equipment would now form about only 8 per cent. of present orchard sprayers in Hawke's Bay and a further reduction is expected.

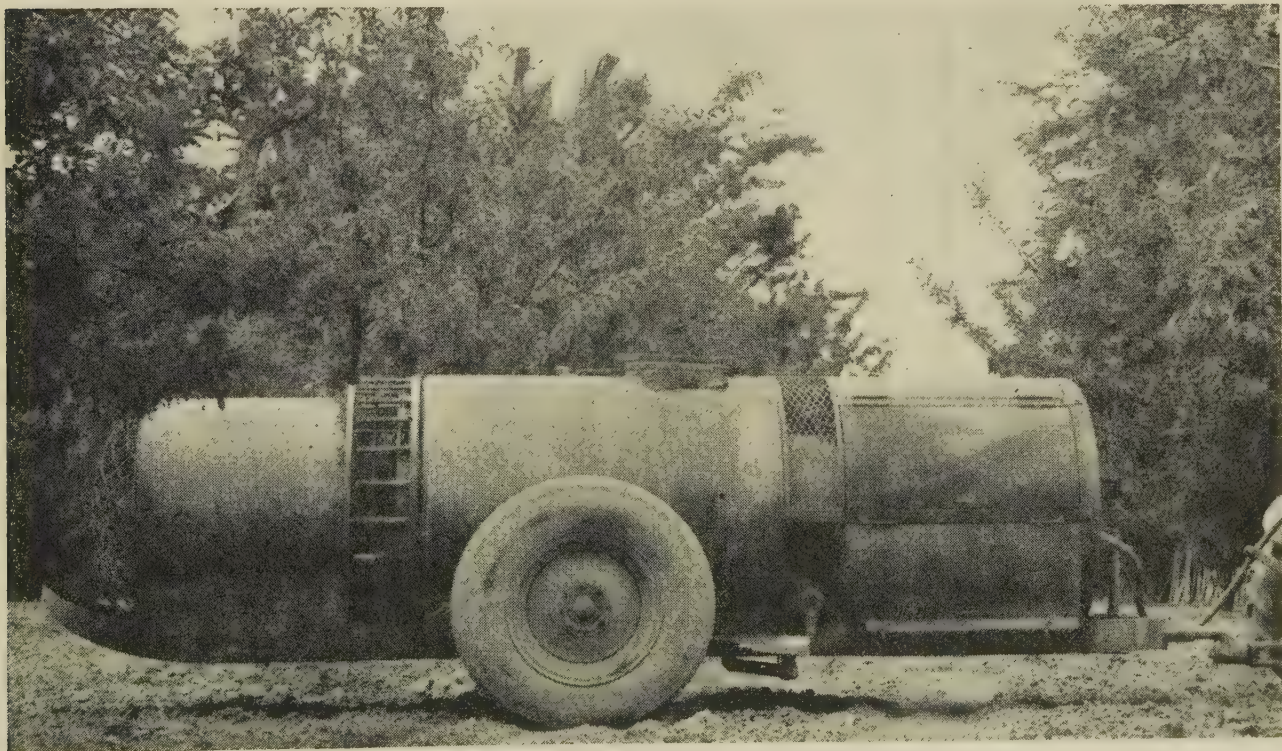
Airblast sprayers: Airblast or air-carrier type sprayers were introduced in 1948, when the first machine was demonstrated to a gathering of growers. Since then airblast spraying has advanced steadily with further introductions of machines suited to both large and medium-sized orchards. The system has proved ideal for the spraying of the larger trees of Hawke's Bay, where almost 40 per cent. of spraying is now done by dilute airblast machines.

Airblast application is an entirely different system from that previously used. Instead of forcing spray liquid into the tree with high pressure from a few nozzles, the airblast technique uses a large volume of fast-moving air to carry spray droplets ejected from a relatively large number of nozzles at a much lower pressure. The airstream is provided by a centrifugal fan operating at a high speed at the rear of the machine. The turbulence so caused has the effect of breaking up spray droplets to small particles, which are carried and deposited on all parts of the tree.

Two main types are used, standard airblast units and airblast attachments.

Of the standard airblast sprayers, "Bean Speedsprayers", "K.E.F.", and "Robinson" airblast machines operate mostly on large orchards, where it may be necessary to cover over 20 acres in a day. These machines, one of which is shown below, have an air displacement of up to 50,000 cub. ft. per minute and can therefore travel at a speed of up to 3 m.p.h., depending on tree size and density. With pump pressure as low as 50lb. per square inch—sufficient only to force spray liquid into the airstream—the output is such that 425 gallons can be applied in 10 to 15 minutes, to spray effectively about an acre of orchard.

Newer airblast machines recently introduced of various sizes and air displacement capacity (see illustration on page 31) are claimed by their makers to be suitable for both dilute and semi-concentrate spraying. Conversion to the latter system merely requires the use of smaller and fewer discs and an increase in pump pressure to break up spray particles sufficiently. Normal operation similar to that of standard low-volume sprayers then applies. If dual-purpose airblast machines such as these prove successful under both



A "Bean Speedsprayer", typical of the large standard airblast units in use.

K-16

ANTI-CORROSIVE PAINT

This revolutionary paint "loves" rusty surfaces, such as rusty roofs, and rusty iron and steel work of all kinds, and gives the appearance of new galvanising. One coat guaranteed good for at least five years.

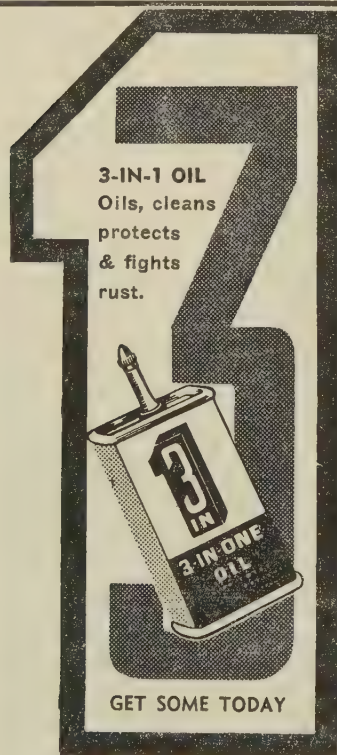
K-16 Anti-Corrosive Paint is equally suited to tradesmen or amateur to inland or seaside conditions; to home-owner or to heavy industry. Available in quarts, gallons, and 4-gallon tins. Stockists everywhere.

Distributed by:

McGILL AGENCIES

BOX 1507, WELLINGTON.

Write for leaflet.



B7-1

SPEEDWAY

LOW & HIGH PRESSURE
**OIL BURNING
BOILERS**

Write for FREE Illustrated Catalogue
SPEEDWAY PRODUCTS LTD.
GT. SOUTH RD., PENROSE, P.O. BOX 34

Branches at
Ford Bldg. Courtenay Place, Wellington
139 Worcester Street, Christchurch

a 2 oz.
daily ration
costs only **1/6**
per head per
month

Molactrate Block contains absolutely no fibre. That's why so little is needed to balance up your rough fodder with the vital food elements lacking at this time of the year.

Keep your hoggets growing through the Winter. And to prevent sleepy sickness in your ewes, feed Molactrate at least a month before lambing.

MOLACTRATE

PROTEINISED
MOLASSES
BLOCK

Order from your Merchant
or Dairy Company today!

Write for Free Leaflet to W. & R. Fletcher
(N.Z.) Ltd. Box 594, Wellington.

G.9391

TAKE A LOT
OF BEATING!
**DRYFOOT
BOOTS**

- ★ Thoroughly waterproof
- ★ Super quality "Commando" Rubber Soles
- ★ See your local store

The DRYFOOT Boot

THE DRYFOOT WATERPROOF

DISTRIBUTED THROUGHOUT N.Z.



BY SARGOOD SON & EWEN LTD

high- and low-volume systems, a distinct advantage is evident. Their efficiency as semi-concentrate sprayers will be watched with interest.

Airblast attachments designed for addition to existing machines are proving very popular in Hawke's Bay. They are obviously the next step from either hand-operated crawler units or automatic high-pressure, oscillating-arm sprayers. For £400 to £500, depending on the unit purchased, a grower can convert his old outfit to a modern airblast sprayer, provided the existing pump, motor, etc., are worth such a change.

The unit consists essentially of a fan and a motor to drive it. (The lower illustration on page 26 shows the design and position of an attachment in relation to the spray tank.) Six nozzles on each side are supplied from a pump working at 300lb. to 400lb. p.s.i. A range of models with varying air displacement capacities is available, the most common being a unit capable of 28,000 cub. ft.

These machines are well suited to Hawke's Bay conditions, and about 50 of them are in use; this being 20 per cent. of the district's machines. For double-sided application on large trees the unit requires for best efficiency a 35-gallons-per-minute pump. With a smaller pump it is sometimes necessary when blocks of larger trees are being sprayed to operate one side only to increase the output per tree and ensure adequate coverage.

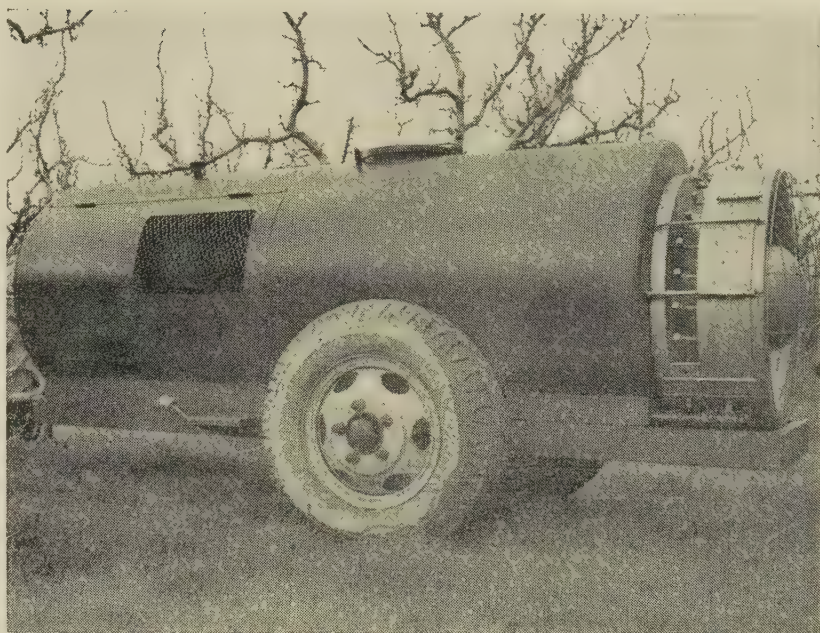
Semi-concentrate or Low-volume Spraying

The relatively new semi-concentrate or low-volume spraying is an entirely different method of application. Because only a quarter to one-third of the usual amount of water applied per tree is used, the spray material going into the tank at two, three, or four times the usual concentration has become partly diluted with air before reaching the tree.

The spray liquid is broken up into very fine droplets which are deposited evenly throughout the tree on fruit and foliage without running together and thus eliminating drip or run-off. Spray droplets are micronised by the ejection of spray liquid through fine nozzle apertures under 250lb. to 300lb. pressure into an axial flow airstream of high velocity produced by a multi-blade turbine. This airstream is directed through a fishtail along the outlet of which is placed a pipeline with seven evenly placed nozzles turned slightly inward toward the air vent.

Low-volume machines as used in Hawke's Bay were first produced in British Columbia, where they were named "Okanagan Turbo-mist" concentrate sprayers. They are now constructed in New Zealand, but retain the essential features of the original machine. With a tank capacity of only

SPRAYING IN HAWKE'S BAY ORCHARDS



A recently introduced airblast unit capable of both dilute and semi-concentrate application. A speedometer is attached to one wheel to ensure accurate speed.

150 gallons the "Turbo-mist" is a small mobile unit of unique design as shown on page 33.

In 1954-55 concentrate sprayers were first used in Hawke's Bay, the efficiency and operational costs of ten machines being recorded. At present there are 31 "Turbo-mists" in the district, all but two being standard, single-sided units. There is one double-sided unit and one conversion unit which is used as a trailer attachment to an existing sprayer.

Being a single-sided sprayer the "Turbo-mist" has appealed mainly to growers on small to average-sized orchards and particularly to those using stationary or portable units in the past. A moderately priced, fully automatic sprayer of this type has meant a big saving in manpower alone to these growers, who are now able to cover 8 to 10 acres a day quite comfortably with only one man.

Apart from savings in labour the introduction of low-volume spraying has meant a significant saving in spray material, especially where an output of up to 500 gallons per acre was required previously under hand spraying to obtain satisfactory coverage of large trees.

In Hawke's Bay the range of output is between 70 and 115 gallons per acre, depending on planting distance and stage of growth of the trees. The lower rate applies to dormant and

semi-dormant sprays of such materials as winter oil and base bordeaux. These materials can be deposited more efficiently by the low-volume technique, thus resulting in less actual material being required for satisfactory control.

At the new rate of 9 or 10 gallons per acre of actual winter oil a saving of up to 50 per cent. has been achieved by many growers compared with previous methods. An even greater saving in copper sulphate has been possible. These savings have applied mainly to early season sprays. From the petal fall stage onward with an increase to 115 gallons per acre and a change to other fungicides and insecticides the difference in material used is not so pronounced, and the quantity used may equal that in dilute spraying.

The standard unit is single sided. Recently introduced, easily fitted double-sided attachments for these units give promise of increasing their scope for the large grower by covering twice the area in the time required for the standard unit. However, with the air output divided in halves, reasonably calm spraying conditions are essential for satisfactory coverage. Spraying at night or early morning is suggested for their most efficient use. A still more recent introduction to the district is a double-sided "Turbo-mist" designed for use on larger orchards. Present indications are that several of these will be in operation this coming season.

the label to look for...

WHEN BUYING FENCING WIRE

Johnson's English Wire, drawn with the skill of 150 years' experience, is protected by patented Hot Dip Galvanising. This ensures long life in New Zealand's climatic conditions and it is particularly resistant to the corrosive action of salt-laden air.

Remember, when about to fence new paddocks or replacing old fences, look for Johnson's round blue label and buy the best... For high country, Johnson's Super Dreadnought is economical.



STOCKS OF PLAIN WIRE READILY AVAILABLE

JOHNSON'S

ENGLISH FENCING WIRE

MANUFACTURED BY: RICHARD JOHNSON & NEPHEW LTD. MANCHESTER, ENGLAND.

SOLE NEW ZEALAND AGENTS:

JOSEPH NATHAN & COMPANY (N.Z.) LTD.

WELLINGTON

AUCKLAND

CHRISTCHURCH

SP.563A



Lambing losses are definitely reduced when you vaccinate against blood poisoning and pulpy kidney

USE 'TVL' VACCINES BEFORE LAMBING

You can get them from...
All Branches of

Dalgety

AND COMPANY LIMITED
(Incorporated in England)

20 YEARS OF LEADERSHIP — AND NOW — THE NEW

FERGUSON 35

— TWO MODELS —
DIESEL & PETROL —

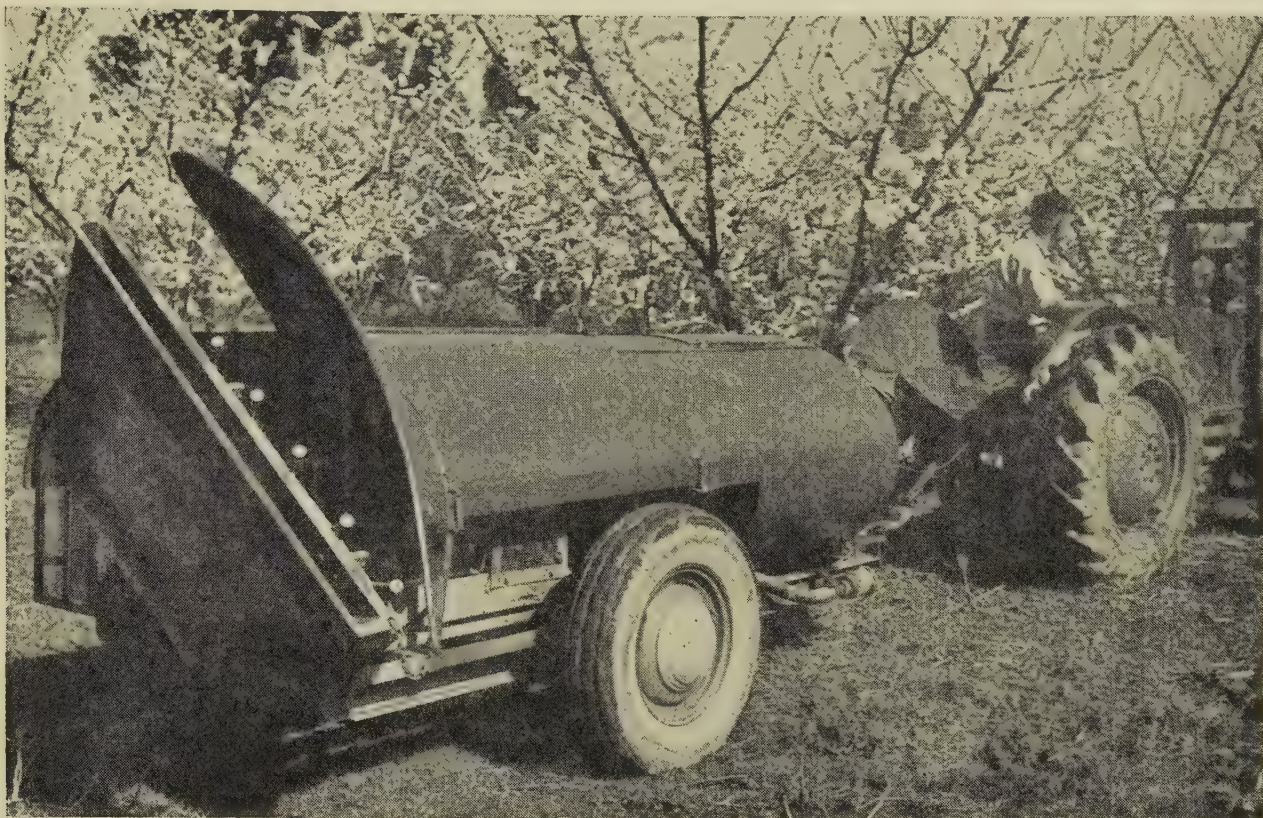
OUTDATES EVERY OTHER TRACTOR



Learn how the new more powerful Ferguson 35 does more for you... quicker and better than ever before. How it increases output—cuts man-hours. And remember this—ONLY Ferguson has what you MUST HAVE for modern efficient farming — the world-famous Ferguson System.

GO YEARS AHEAD GET A FERGUSON 35

C. B. NORWOOD LTD., BOX 298, WELLINGTON.



A "Turbo-mist" semi-concentrate sprayer. Over 30 of these machines are operating in Hawke's Bay, where they have proved ideal for medium-sized orchards.

Efficiency

When automatic spraying was first introduced into Hawke's Bay's blocks of large peach, apple, and pear trees there was some suspicion that such a system would be detrimental to efficiency. It was difficult to convince growers that pest and disease control could be satisfactory without the conventional hand spraying methods to which they were so accustomed. However, the first few years' experience soon showed that automatic sprayers were efficient if operated correctly. Though many will still argue that for maximum efficiency there is no substitute for the careful application of sprays by hand, the convenience, labour saving, and speedy operation of automatic equipment greatly outweigh any disadvantage in this direction.

Besides using a satisfactory spray programme for efficient control, operators have to watch nozzle adjustment and speed of travel very carefully. The same factors apply with all types of automatic sprayers. With the elimination of the personal factor as in hand spraying a spray pattern adjusted to cover all parts of the tree is essential, with the main volume

directed to the top two-thirds of the tree.

Correct speed of travel is also an important aspect in providing efficient coverage. With airblast and concentrate sprayers which provide coverage by first displacing all the air within the tree, correct and even spraying speed is essential. This is probably the most important single factor in concentrate application, as the smaller volume of axial flow air becomes turbulent only after it has been driven among the trees. Though velocity at the air vent is over 100 m.p.h., this velocity is rapidly lost.

To achieve maximum penetration and satisfactory deposition of spray droplets a reasonably slow and constant speed of travel of sprayers is essential. The speed varies according to the stage of growth. Under Hawke's Bay conditions speed of travel for "Turbo-mist" sprayers is $1\frac{1}{2}$ to $1\frac{1}{2}$ m.p.h. for dormant and early sprays up to petal fall. Thereafter for full cover applications speed is further reduced to $1\frac{1}{4}$ m.p.h. This range is strictly adhered to and some operators use revolution counters on tractors or speedometers attached to sprayers to assure correct speed.

Trends

Automatic spraying will no doubt be even more highly developed in the next few years. There is a definite trend to automatic semi-concentrate application and there is considerable demand for efficient machines for the low-volume system.

Growers with airblast sprayers are recognising the advantages in material saving brought about by low-volume application and are reducing their outputs by using smaller discs and travelling more slowly. In this way the quantity of early-season spray materials particularly has been drastically reduced with a saving of up to one-third in oil and bordeaux and with no loss in efficiency.

Development overseas has reached the stage where materials including lime sulphur have been applied successfully, without dilution, with a fully concentrate sprayer. It is not likely that such practice will develop commercially in this country. However, as in British Columbia, it is possible that applications as low as 50 gallons per acre may become standard within the next few years.

Care of Livestock during August

Contributed by the Animal Research Division

COWS about to calve should be brought into a handy paddock so that they can be kept under supervision. If a cow has difficulty in calving, veterinary assistance should be sought. This should be done as soon as it is obvious that the presentation is not normal and in any case within 6 hours of the beginning of labour. Unskilled interference exhausts the cow and makes the veterinarian's task more difficult or even impossible. Veterinary assistance should also be sought if the cows do not clean within 48 hours. Do not hang weights on the afterbirth.

Autumn-saved pasture is the best food for newly calved cows, but it must be grazed in small breaks which the cows will clean up in about 2 hours. They should continue to receive as much silage as they will eat and if the pasture is short and sappy, they should also receive hay.

Calves should be fed their own mothers' milk for at least the first 2 days. This is important, as the first milk, known as colostrum or "beastings", contains substances which increase a calf's resistance to scours. Since over-feeding is an important cause of this trouble, feed not more than 6 pints daily during the first week, 7 pints during the second week, and 8 pints during the third week. If whole milk is fed, there is no need to give more than 7 pints daily. If scours occurs, a supply of a sulpha drug should be obtained from a veterinarian immediately, as the drug is very effective when used promptly. Calves should not be kept in a calf paddock. When 2 to 3 weeks of age they should be rotationally grazed ahead of the cows. This will ensure that they always have access to good, fresh pasture, which they will eat readily. Where good pasture is available calves can be weaned quite satisfactorily at 8 weeks.

Further information about the good rearing of dairy stock is contained in the Department of Agriculture's Bulletin No. 228.

The full sisters of high-producing heifers should always be kept, as should the daughters of Merit Sires with a high progeny test. Provided they are sturdy, the calves of very old cows with good lifetime performance should always be kept, and there is no reason why the calves of well-bred heifers should not be kept. The heifer twin of a bull calf should never be kept. Twin heifers may be kept with safety, provided they are not too small, especially if born early in the season.

Milk from each quarter should be examined with a strip cup before milking. If it shows any abnormality, or if the udder appears inflamed, treatment with penicillin should be begun at once. Three tubes of 25,000 units should be injected at 24-hour intervals even if the milk appears normal after the first tube. Prompt treatment early in lactation will often save a quarter which otherwise might become weak or even blind.

If difficulty was experienced in getting cows in calf last summer, now is the time to seek veterinary advice to

prevent similar trouble this year. Facilities for diagnosing infectious infertility are available at both the Wallaceville and Ruakura Animal Research Stations of the Department of Agriculture. Specimens must be submitted through veterinarians or Livestock Instructors. Effective control depends on accurate diagnosis.

Calves and yearlings may become very lousy during late winter and early spring. Control can be effected by the use of suitable dips, sprays, or washes. Those containing DDT, BHC, dieldrin, or aldrin are most effective. Repeated treatments may be necessary, as the eggs are difficult to destroy.

About 10 per cent. of all lambs are either born dead or die during the first week. These losses can be reduced by careful shepherding. Many lambs and some ewes can be saved by skilled assistance during lambing. Always use a reliable lubricating antiseptic on hands and wrists. Faulty presentations must be corrected. A lamb should never be forcibly pulled away when a leg or a head is turned back.

A number of lambs die from suffocation through the cleanings remaining over their nostrils; these are very easily removed. Where necessary lambs should be assisted to get a drink. This is particularly important where ewes have very large teats. Drawing away a few squirts from these will reduce their size and enable the new-born lambs to suckle. Ewes with very large teats, very small teats, badly placed teats, or defective udders should be marked for culling. A big percentage of their lambs will die. Many lambs which die during cold or wet weather would survive if they got a good drink soon after birth.

Red worms reduce the efficiency of farm horses. Drenching with phenothiazine now will prevent the pastures becoming contaminated with eggs and thus reduce the chances of reinfestation in spring. As phenothiazine causes very severe reactions in some horses, dosing should be done under veterinary supervision wherever possible. If this cannot be arranged, divide the dose recommended on the package into five parts and give them over 5 days.

Navel disease is contracted in the incubator, which should be scrupulously cleaned and fumigated with formalin between batches of chicks. Pullorum disease can be controlled only by repeated blood testing of all stock, immediate disposal of all reactors, and thorough cleaning and disinfection of premises after each test.

Vitamin D, known as the "rickets preventing" or "sunshine" vitamin, is essential to young chicks for normal bone development. Chicks denied daily exposure to sunlight by intensive rearing or prolonged cloudy weather require vitamin D added to the diet, and it is advisable to use fish liver oils containing this vitamin as a routine supplement. The amount added varies according to the potency or "strength" of the oil; for example, up to $\frac{1}{4}$ pint of an oil containing 100 units of vitamin D per gramme to 100lb. of mash, or half that quantity of an oil containing 200 units of vitamin D.

Oversowing, Topdressing, and Fencing of Hill Country

Seasonal Notes by the Extension Division

HILL country improvement requires careful planning and, though the general procedures are fairly straightforward, details depend on local conditions. District advice on types of fertiliser, oversowing mixtures, time of sowing, and pasture management should be sought from local instructors of the Extension Division.

NORTH ISLAND SURFACE-SOWN PASTURES

IT is generally agreed that autumn topdressing and oversowing with clovers have given the best results, but until recent years nearly all the comparisons between autumn and spring applications of fertilisers and clover seeds have been made on the lower country, where establishment of pastures from autumn sowings is generally better than from spring sowings.

In the inland and colder districts and on the higher hill country there is no doubt that spring topdressing gives as good, if not better, results than autumn topdressing, and spring sowing of pastures and spring oversowing with clovers give the young pasture and clover plants better conditions for establishment and rapid early growth than would autumn sowings. There are, therefore, many thousands of acres of hill country in the North Island where spring topdressing and spring oversowing can be done with confidence of good results.

Spring topdressing can be done from August to November and, provided quick acting phosphates, such as superphosphate, serpentine superphosphate, or basic superphosphate, are used, the clovers will respond, as this is the time when they are starting into vigorous growth.

The conditions in spring on this type of hill country are generally better for the successful oversowing of clovers. There is little, if any, rank top growth, the soil is moist, and with the advance of spring and warmer weather the development of the young clover plants, especially white clover, is not affected by cold and frost. Spring oversowing can be done from August to early October, the later sowings being satisfactory in the colder and, therefore, later districts.

To the jobs that can well be done in spring by agricultural aviation, such as liming, weed spraying, and dropping fencing materials, can be added topdressing and clover oversowing on a considerable area of hill country where conditions are too wet and cold in late autumn and winter and the clovers stop growing too early for autumn topdressing or oversowing to be as successful as spring applications.

—J. A. GRAHAM

SOUTH ISLAND

IN the past 10 years, and particularly in the last 5 years, in the South Island it has been shown that on hill country it is possible to carry out spectacular improvement of pastures by topdressing and oversowing. What has been considered marginal land in the past may now prove to be limited in its potential production only by climate and not by incapacity to grow highly productive clovers and grasses. On many farms, however, the management of the improved pastures is lagging behind the pasture improvement. The answer to this on many farms lies in better subdivision.

—P. R. BARRER

MISTAKES IN SILAGE MAKING

MISTAKES in silage making are revealed as stacks and pits are opened up for feeding out. It is worth while to consider the problems revealed by last season's harvest and plan now for better silage next year.

Many fields closed for silage are cut far too late, with the result that the material is too stalky, proving difficult to consolidate in the pit or stack. Consequently, the silage becomes too dark and overheated and losses in feed value are high. If closing dates of silage paddocks are spaced so that the paddocks are ready for cutting at intervals, a lot of this trouble can be avoided.

Conversely, early cuts of very leafy material are frequently put in too green, so that the lower layers of silage come out sour and sloppy, instead of the desirable lactic acid type. If the first day's cut is allowed to wilt before it is taken in, the quality of the lower layer is greatly improved.

Some farmers still cut all of the paddock at the one time, before beginning the actual stack building. When this is done the last day's make is usually far too dry, is impossible to consolidate, and gives rise to much top waste. It is vital, particularly when a buckrake is being used, that the material used to top the stack be as green and leafy as possible so that a good top consolidation can be obtained.

Finally, much waste is caused through having the sides of pits and trenches too straight. There should always be a slight batter, so that the silage will not pull away from the pit walls. The final day's make should be well topped up, to shed rain-water, and not be left almost flat.

—A. V. ALLO

REPAIR OF FARM BUILDINGS

THE off-season offers excellent opportunities for the repair of farm buildings. With the exception of lead-based paints, which should not be used in frosty or damp weather, exterior protection can be provided with copper naphthalate preparations or with tar-based or creosote paints. The addition of 25 per cent. of raw tar to creosote will give a lasting black colour to rough sawn timber, but the colour is soon leached off dressed timber.

All timber work should be checked for borer and a dressing of 5 per cent. pentachlorophenol in lighting kerosene or other recognised treatment applied if borer are found. Any timber affected by dry rot should be replaced and the cause remedied. Because dry rot is a result of continued dampness, the reason for it will usually be found in faulty downpipes, poor spouting, or lack of spouting.

Roofing iron should be checked for signs of rusting, and if rust is present, it should first be removed with a wire brush (corrugated wire brushes are available for the treating of large areas). Rusted areas are best controlled by applying first a commercial rust inhibitor or a fish oil paint and then a good roofing paint. Tar-based paints are also successful on roofs and are best applied on a hot, sunny day. If large areas are to be painted, a cheap household broom should be used and, the paint held in a 4-gallon tin, opened lengthwise.

It is sound policy also to check the foundations of farm buildings. Any rotted wooden piles should be replaced with concrete piles, wooden blocks being used to make up any difference in height. A piece of malthoid should be placed between the concrete and the wood to act as a damp course.

The first opportunity should be taken of concreting any earth or gravel floors in farm buildings, for this greatly assists ease of working in such sheds and facilitates keeping them tidy.

—C. J. CROSBIE

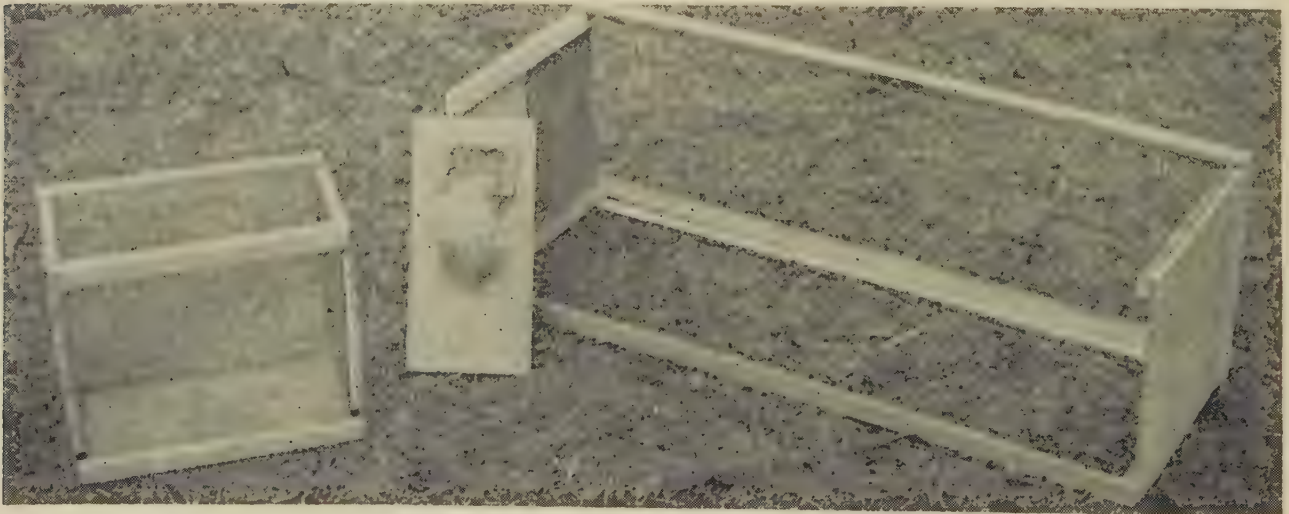
Container for Air Transport of Bees



SINCE the Department of Agriculture in co-operation with interested beekeepers first demonstrated in 1952 the practicability of air transport of honey bees from North Auckland to South Island beekeepers a considerable trade in package bees between the two islands has developed. As the safety and comfort of crews and passengers is of paramount importance in air transport, much time and thought have been devoted by producers, officials of National Airways Corporation, and officers of the Department of Agriculture to the development of a container which would provide the maximum degree of safety while still allowing the transport of the bees without undue loss or deterioration through overheating or lack of ventilation. In this article D. Roberts, Apiary Instructor, Department of Agriculture, Auckland, describes the type of thoroughly tested container which must now be used if packages of bees are to be accepted by National Airways Corporation.

▲ Crated packages of bees being loaded into an aircraft at Kaitia, Northland.

▼ Package and crate partly constructed.



BECAUSE honey bees are beneficial insects of great importance to mankind, they have been introduced and cultivated in all parts of the world where natural conditions provide sufficient sustenance to ensure their survival. Apart from the honey bees' production of honey, in itself a not inconsiderable contribution to the world's food supplies, their services as pollinators of food-producing trees and plants are of the utmost importance. The increasing recognition of their value in this respect has immeasur-

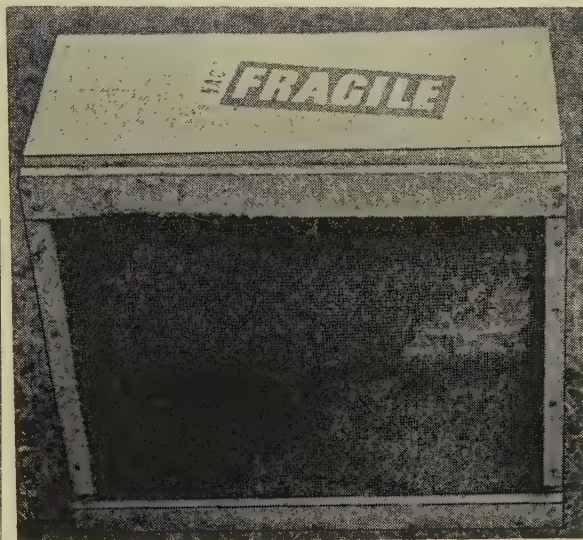
ably increased the demand for their services, with the result that transport of honey bees from place to place is now a widespread activity in most agricultural countries.

With this greatly increased movement has come a considerable change in methods of transport. The natural habits of honey bees combined with their susceptibility to injury or death through close confinement, lack of ventilation, or overheating make their confinement and transport in solid containers impractical except for very

. . . BEE CONTAINER

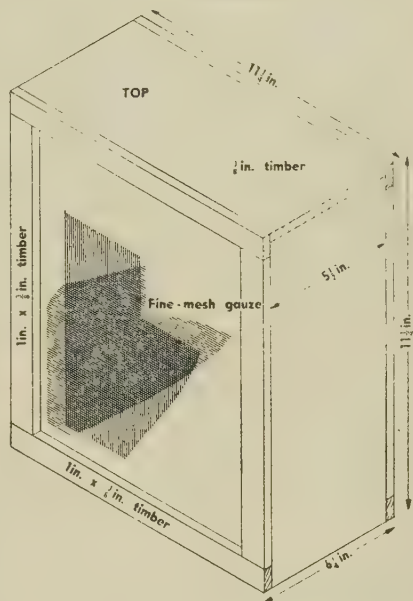
short periods or in special conditions under the control of experienced bee-keepers well versed in their requirements.

Successful transport by public facilities entails the provision of specially constructed containers and where, as is usual, no expert attention is available en route the selection of the most rapid means so that the period of confinement is reduced to the minimum.

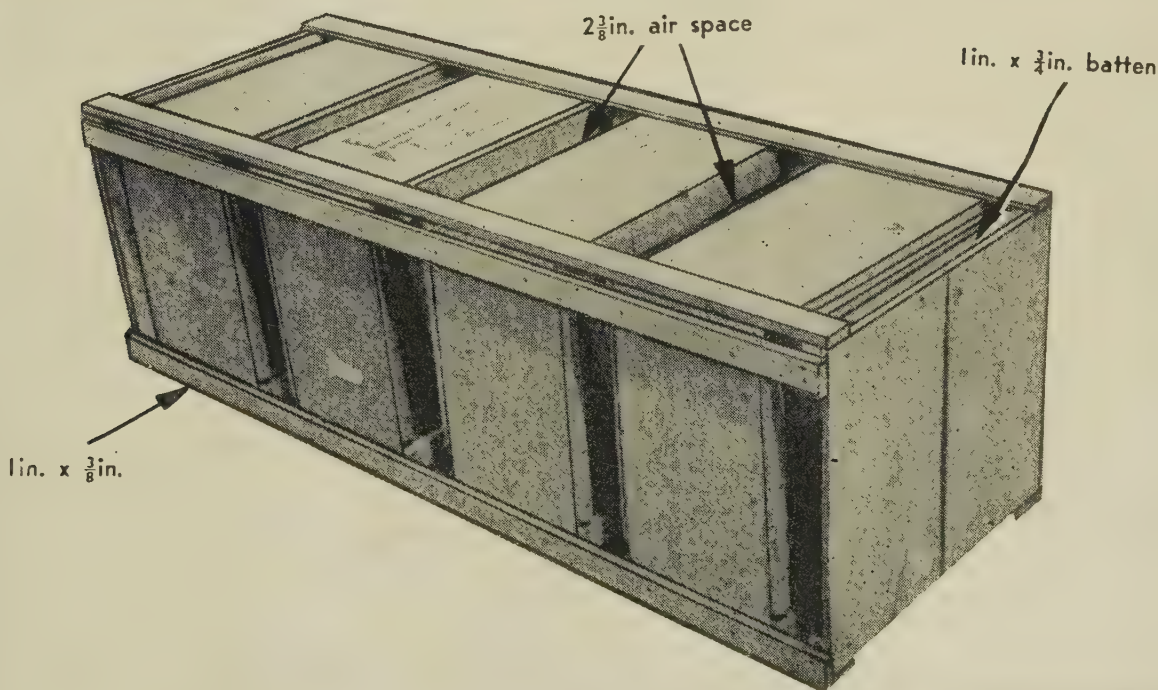


Dimensions of →
individual package.

← Package filled
with bees and ready
for assembling into
crate.



Completed crate ▼
holding four pack-
ages.





why chop and change?
you'll always
come back to—

Reidrubber

THE WORLD'S BEST

MILKING RUBBER

INFLATIONS.

BLACK: Extra resistance to cracking. **ORANGE:** Super soft. For ease of ring fitting. **RED AND GREY:** Proven in service. "MILKWELL": New improved design — tapered end. **TUBING:** In red and grey which built Reidrubber's reputation for reliability — and the new Black, specially recommended for Claw Tubes.

REID NEW ZEALAND RUBBER MILLS LTD.

MR 563

PREPARE NOW
to protect that lush
spring growth!

Early spring grazing is too
valuable to waste . . .

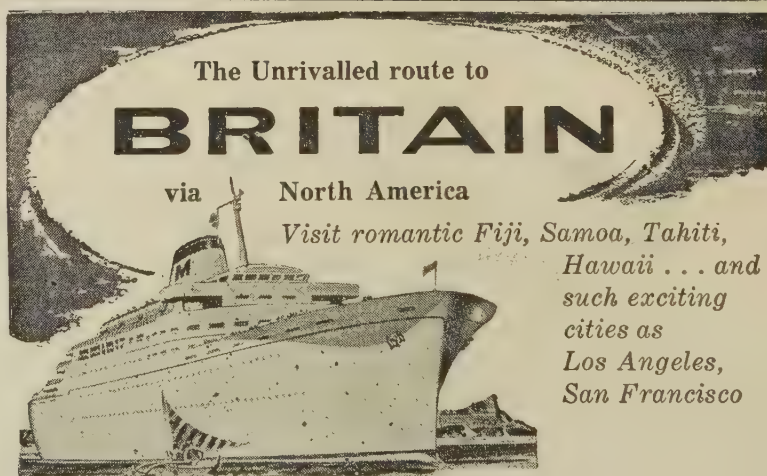


MAKE THE MOST
OF IT WITH
THE

WOLSELEY
ELECTRIC
FENCER

At all Branches of

Dalgety
AND COMPANY LIMITED
(Incorporated in England)



The Unrivalled route to

BRITAIN

via North America

Visit romantic Fiji, Samoa, Tahiti,
Hawaii . . . and
such exciting
cities as
Los Angeles,
San Francisco

Sail on the new Matson Liners

MARIPOSA AND MONTEREY

Air-conditioned throughout, with all accommodations in first class, these luxurious new liners bring you Matson's famed prewar luxury service. Fares are surprisingly moderate and payable in New Zealand currency. With a choice of routes and wide range of itineraries, with a fun-packed program of shipboard entertainment and stops at fascinating ports of call, you can make every day an unforgettable memory.

Regular sailings from Auckland
every 10 days.

Information and reservations from
any Matson Lines Agent or from
HENDERSON & MACFARLANE
LTD., 56 Quay Street, Auckland,
and **BURNS PHILP & CO. LTD.**,
Lambton Quay, Wellington.

Matson Lines

4.6D

THE OCEANIC STEAMSHIP COMPANY
(Limited Liability—Inc. U.S.A.)

CONTAINER FOR AIR TRANSPORT OF BEES



▲ Screen cage on truck to prevent flying bees having access to packages collected for air transport.



The development of air transport has greatly simplified some of the problems associated with the movement of honey bees by public utilities, but the requirements peculiar to the carriage of air freight demand that the most careful attention should be given to the design and secure construction of containers. Experience over the past few years has shown that the design of packages and containers could be improved.

The cages and crating shown in the illustrations are regarded as offering the maximum security consistent with

← Equipment used for filling air-transport packages in the field.

the health of the bees and a reasonable freight charge. The specifications were decided in consultations between the principal producer of packages, Mr. W. I. Haines, of Kaitaia, officials of National Airways Corporation, and the Apiary Instructors of the Department of Agriculture, Auckland.

When properly constructed and securely crated the package cages form a very rigid construction which should withstand any normal hazard. The great care taken in the construction of the packages and their crating combined with the very efficient freight service of National Airways Corporation should ensure that packages of bees as now dispatched reach their destination in the best possible condition. At the same time the safety requirements are fully met.

Are you
prepared
to deal with
Mastitis
NOW?

Should profit-stealing mastitis break out in your herd, could you treat it immediately? The Dairy Farmer with a ready supply of Vetspen Cerate has the remedy in his hands. Don't take the chance of losing valuable production — order Vetspen Cerate now from your usual supplier.

You have the choice of four strengths.

'25'
25,000 units
penicillin
per tube.

'50'
50,000 units
penicillin
per tube.

'100'
100,000 units
penicillin
per tube.

'500'
500,000 units
penicillin
per tube.

VETSPEN CERATE



PENICILLIN UDDER INJECTION

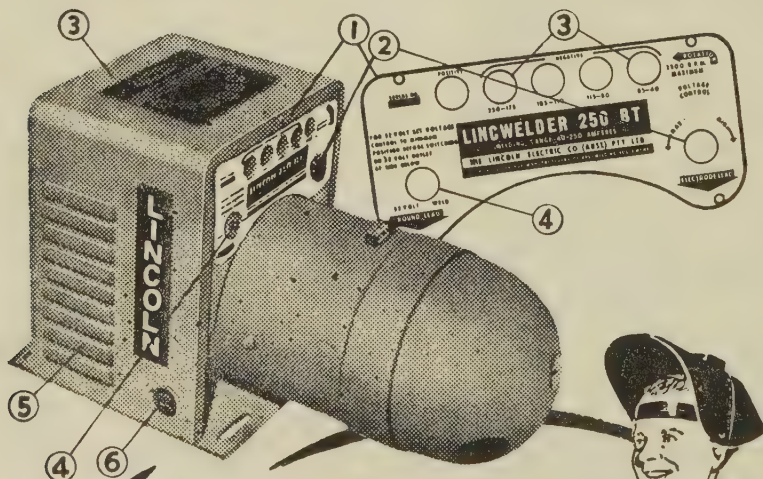
each tube of Vetspen Cerate delivers
a full dose of penicillin. The handy
flat tins of 12 tubes are colour
coded for easy recognition.



GLAXO LABORATORIES (N.Z.) LTD.,



PALMERSTON NORTH



*It has all the features
you've asked for in a
FARM WELDER*

current for power tools, lights. (5) Operates at only 2500 r.p.m. (6) Lowest priced farm generator with safe rated output of 250 amps.

THE NEW **BIG** LINCWELDER 250 B.T.

Developed by Lincoln to answer demands from farmers for a powerful big capacity (40-250 amps.) farm generator. Now it's here—full of new features that make it your most useful farm tool. The big Lincwelder 250 B.T. will produce smooth, sound welding for even a beginner. It can also be used for battery charging, lighting and operating power tools.

Send in for full details and you'll soon see why you should own a BIG Lincwelder 250 B.T.



SEND FOR FREE DETAILS

The Lincoln Electric Co. (Aust.) Pty. Ltd.
P.O. Box 1482, Wellington, C.3., N.Z.

Please send details of new Lincwelder 250 B.T. for
Belt drive ☐ Electric drive ☐ Engine drive ☐

NAME

ADDRESS

WORLD'S LARGEST MANUFACTURERS OF ARC WELDING EQUIPMENT

Natural Hatching of Eggs

By B. J. RUSSELL,
Poultry Instructor, Department of Agriculture, Wanganui

MANY householders still prefer to hatch out their chicks by broody hens because the size of their breeding pen does not warrant the use of an incubator or the sending out of the eggs to a hatchery to be custom hatched.

NATURAL hatching restricts the period when chicks can be hatched, as usually it is difficult to obtain broody hens until late in the season.

The best broody hens are usually the heavy breeds such as Australorps or Rhode Island Reds, but extra large hens should be avoided, as they often prove clumsy and may break the eggs. A hen showing any signs of scaly legs should be avoided also, as there is a danger of this disease being passed on to the chicks.

Many breeds of bantams make excellent sitting hens and prove excellent mothers to the chicks, the only drawback being the number of eggs that they can sit on satisfactorily. A hen will sit on 13 to 15 eggs comfortably, and a bantam will sit on only 6 to 9 eggs.

As using broody hens reduces the number of eggs that can be set, particular attention must be given to the selection of sitting eggs.

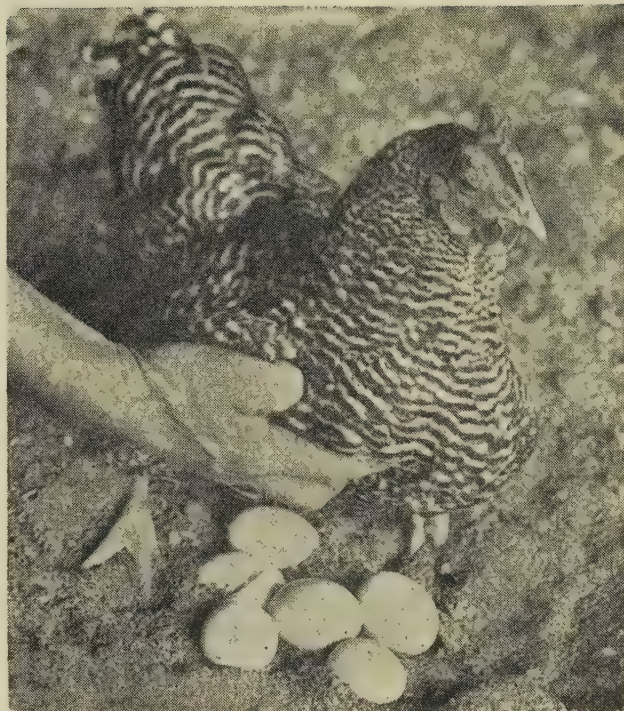
The quality of the eggs set affects the quality of the future stock. Not only do well-selected eggs hatch better, but they affect the quality of the eggs produced by the pullets hatched from them. Only eggs of 2oz. to 2½oz. should be set. Misshapen eggs or eggs showing any faults such as porous shells, rough shells, or hair cracks should be discarded.

The fresher the eggs are the better they will hatch, but if they have to be saved for a long time, they should be turned each day to prevent the yolk with the germ uppermost on it floating toward the shell membrane. When this happens the germ is liable to stick to the membrane and be destroyed. Alternatively the eggs may be stood on end in a suitable container, large end uppermost, making turning unnecessary, if not held for more than 10 days.

The Sitting Box

Many different types of sitting boxes are made, but one 14in. to 15in. square and at least 18in. high can be used. With this type of box an easily movable front, with 4 to 5 holes 1in. in diameter for ventilation, should be provided. If the nest is to be used outside, a waterproof lid must be fitted. Whatever type of sitting box is used, it is advisable to place fine-mesh wire netting on the floor, but enough slack should be allowed in the netting to allow it to form into the shape of the nest.

The wire-netting floor should be down on earth, but not on a board or concrete floor. Placing the box on the earth allows natural moisture to rise to the eggs and assists in the hatching. Unless this is done, the shell membranes of the eggs will be tough at hatching time and the chicks will have great difficulty in breaking out of the shells.



If a sitting hen will not voluntarily leave the nest to feed, she should be gently lifted out and placed near the food. When the hen is lifted a hand should be placed under each wing, which should be gently raised to free any eggs under them; otherwise eggs might be picked up with the hen and dropped and broken.

The wire netting on the floor of the sitting box should be covered with damp sand or an upturned sod of turf pressed into the shape of a saucer to prevent the eggs from rolling out toward the edges. The soil or sand should then be lightly covered with chaff, chopped straw, or hay. This prevents the eggs from being chilled by the moist soil, but it should not be deep enough to cover the eggs completely.

Preparing Broody Hens

When a suitable broody hen is obtained she should be treated for body lice with a dusting powder or with nicotine sulphate by placing two drops of the liquid under each wing and below the vent. Hens that are covered with lice become restless and may leave the nest.

The broody hen should be placed on some dummy eggs and left for 48 hours to make sure that she is fully broody and will sit well. The dummy eggs can then be taken away and the hatching eggs placed under the hen.

Management of Sitting Hens

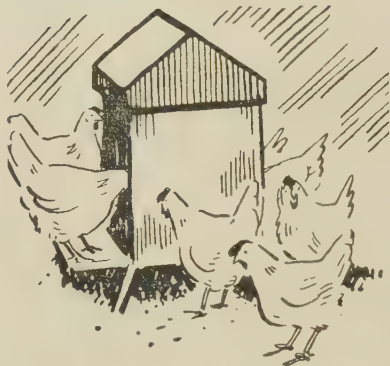
After the sitting hen has been on the nest for 24 hours she should be encouraged to leave the nest to feed, drink, and pass droppings. If she does not leave the nest on her own account,

she should be gently lifted out and placed near the food. When removing a broody hen from the nest, gently raise the wings by placing a hand under each wing to free any eggs under them; otherwise these may be picked up with the hen and accidentally dropped and broken.

Wheat and maize are excellent grains for feeding hens. One grain meal a day is sufficient for sitting hens and fresh water is essential.

As soon as hatching is completed remove the egg shells and all unhatched eggs. Allow the chicks to rest and dry before removing them to the brooding coop. Some prefer to place a wire-netting coop in front of the nest and rear the chicks in the same nest. This practice is useful when more than one hen is sitting at the same time, as this prevents the hens from wandering or endeavouring to claim the same nest.

Care should be taken to ensure that sitting hens are not disturbed by dogs, cats, other hens, or rats and are not suddenly frightened in any way. When only one hen is set it is wise to have a reserve hen sitting on dummy eggs ready to change over in case the set hen should suddenly leave the nest or start to ail. This may save valuable eggs.



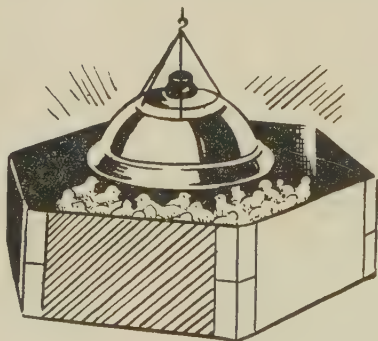
RAISE THEM THIS EASY WAY

—Then feed them
Automatically!

THE HAYMAN "DULL RAY" ELECTRIC BROODER rears 25 to 200 chicks in the gentle warmth of its infra red rays . . . no bright light to disturb them . . . no intense heat to harm them. The Dull Ray stores heat in case of power failure or cuts. Price complete with extra large aluminium reflector £8/17/6 plus freight . . . Optional chick surround £3/8/6 extra.

With an ASCOT AUTOMATIC SELF HELP POULTRY FEEDER any bird over 3 lbs. in weight can feed itself. Rat proof, sparrow proof and weather proof the small model holds enough feed for 50 fowls for one week or 25 fowls for 2 weeks. Large model holds double the quantity. Clean and hygienic it'll save you much work. Standard model £10/5/- plus freight. Large model £15/10/- plus freight.

Available now from all good stock agents or write direct to L. T. Hayman Ltd., 21 Portage Road, New Lynn, Auckland S.W.4 for further information.

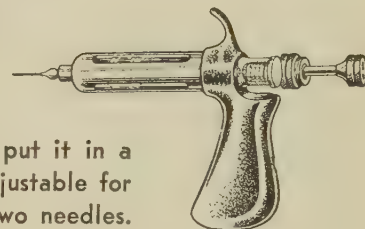


HAYMAN
ELECTRICAL APPLIANCES

EXCELLENT HYPODERMIC SYRINGES

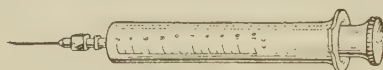
The WILCOX MOFFLIN HYPODERMIC

is a high quality precision instrument for fast, accurate and hygienic inoculation. It is strong, light, durable and possesses several exclusive features that put it in a class of its own. 20 c.c. capacity and adjustable for 1 c.c. to 5 c.c. doses. Price 93/6 with two needles.



also available in the

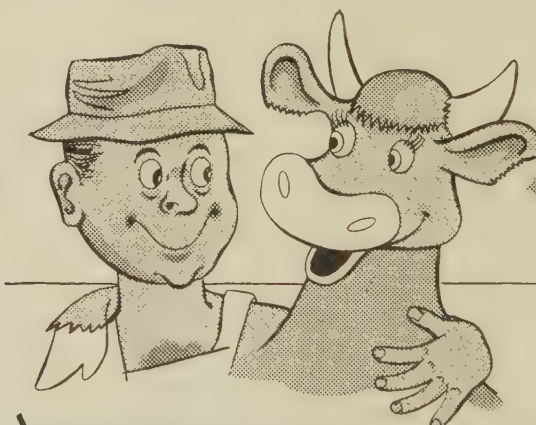
VANDERMIC SYRINGE This is a light, unbreakable NYLON hypodermic graduated from 1 c.c. to 20 c.c. and fitted with double suction washers. Indestructible under any normal conditions and made to give long and satisfactory service. Supplied with needle. Price 18/9



Obtainable from Stock and Station Agents or write—

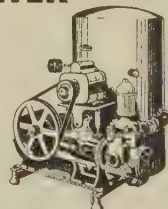
**COOPER, McDOUGALL & ROBERTSON
(N.Z.) LIMITED**

P.O. BOX 599 — AUCKLAND, C.1.



'TROUGHS ARE ALWAYS FULL'
WHEN DAVIES PUMPS THE WATER

A farm without water is like a man without air. For water on a farm means good food for the animals . . . and when a reliable Davies Pump is used the farmer has no worry about empty troughs. Davies have a wide range of pumps for all purposes, including centrifugals both motorised and pulley driven. Enquire now:



D. H. DAVIES & CO. LTD.
Penrose and Newmarket
AUCKLAND . . . Phone 594-531
DEALERS THROUGHOUT N.Z.

DAVIES

"Weaner Coop" Keeps Young Pigs Warm

By A. LONGWILL,

Superintendent, Pig Industry, Department of Agriculture, Wellington

WHEN pigs are housed shortly after weaning in a fattening house unit or other house which is too large for them to keep warm they do poorly in cold weather and usually fail to keep their sleeping quarters clean.

A RECOMMENDATION which has often been made is to partition off the sleeping quarters, giving the weaners only sufficient room to lie so they will at least keep this area clean. Though this is successful in enabling the pigs to keep clean, it only partially solves the problem of comfort for the weaners. They will make reasonable use of their food only if they have a warm bed and are able to maintain the air immediately around them at about 60 degrees F. or above.

With this aim in view the "weaner coop" illustrated at right has been installed in the fattening house on the Flock House Farm of Instruction, Bulls. It is constructed on a 2in. wooden frame and is lined on the inside with polished sheet aluminium to reflect heat radiated by the pigs. The space between the lining and the outside hardboard sheathing is filled with locally manufactured rock wool insulation.

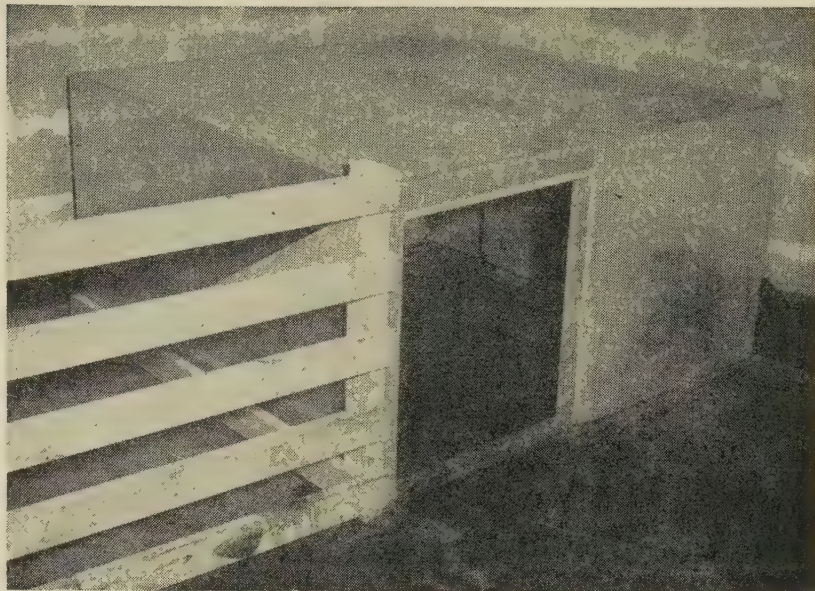
There is no floor, the unit being set in a corner of the sleeping quarters of the fattening house, the floor of which is of coke breeze concrete sealed with $\frac{1}{4}$ in. of pure bitumen. On a floor less well insulated the floor area to the front retaining board should be filled with wood shavings or other dry bedding.

No Special Ventilation Needed

No special arrangement is made for ventilation, as it is found that that from the 20in. x 20in. entrance is adequate inside the larger house.

The coop is 4ft. x 4ft. x 2ft. over-all and the remaining 4ft. of the sleeping quarters is closed off by a wooden partition specially built to fit and hold the coop in position without the need for floor bolts. The fattening house is of the Harper Adams type and the partition is bolted to the stub wall which runs between the sleeping quarters and the rear entrance. This fitting could be amended to suit other types of house. It would be an advantage to build the partition with close vertical boarding on the outside or to sheath this side with flat galvanised iron.

The outside of the coop should be painted with a light-coloured, enamelised paint for preservation and ease of cleaning.



The cost of materials (£23) used in the construction of this coop is as follows:—

	£
Timber for frame and partition	3
Aluminium alloy sheet N.S.3	6
Rock wool insulation	8
Hardboard and cover strips ..	5
Screws, washers, nails, paint	1

The farmer who so desires can build a somewhat less effective, but still serviceable, coop at a lower figure, but for lifetime efficiency it is probably worth while to build somewhat along the lines indicated here.

Meteorological Records for May

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	56.4	+ 0.1	71.2	41.6	5.76	19	— 1.43	2.27	4	162
Auckland	160	59.0	+ 2.4	74.4	45.5	5.88	22	+ 1.09	1.64	4	153
Tauranga	10	54.9	+ 1.3	68.9	34.7	6.19	18	+ 1.06	1.78	16	167
Ruakura	131	54.0	+ 2.6	71.4	35.8	6.46	23	+ 1.96	1.10	4	117
Rotorua	975	51.7	+ 1.5	68.6	33.0	6.47	19	+ 1.19	2.20	4	122
Gisborne	12	54.2	+ 1.3	73.4	34.1	2.61	10	— 2.16	1.10	16	168
New Plymouth ..	160	56.2	+ 2.5	68.2	41.0	9.17	23	+ 3.10	1.73	4	130
Karori	2125	46.8	+ 1.3	66.3	30.8	9.13	26	+ 5.11	1.14	15	
Napier	5	55.6	+ 2.8	77.1	32.1	2.51	12	— 0.83	1.06	16	152
Wanganui	72	55.0	+ 2.0	71.1	40.4	7.37	23	+ 4.25	1.36	15	114
Palmerston North	110	52.6	+ 1.6	72.3	33.0	6.31	24	+ 2.99	1.18	20	107
Waingawa	340	51.4	+ 1.9	72.0	25.5	4.50	20	+ 0.45	1.20	17	121
Wellington	415	53.7	+ 2.4	70.0	36.9	5.36	16	+ 0.80	2.03	16	121
Nelson airfield ..	5	50.3	+ 1.8	66.0	26.1	5.40	16	+ 2.36	2.33	21	130
Blenheim	12	52.0	+ 2.4	71.4	27.9	3.95	11	+ 1.42	1.20	21	154
Hokitika	15	49.4	+ 1.2	65.6	30.7	12.21	24	+ 2.93	2.18	22	97
Hanmer	1270	46.4	+ 1.6	71.0	24.0	7.90	15	+ 3.42	1.58	16	106
Christchurch ..	22	49.5	+ 1.9	72.3	25.7	8.21	15	+ 5.36	2.48	17	139
Ashburton	323	48.6	+ 1.9	72.8	28.2	6.14	13	+ 3.59	2.18	19	119
Timaru	56	48.0	+ 1.2	67.6	31.5	3.51	11	+ 1.98	0.95	19	112
Alexandra	520	46.0	+ 3.1	69.4	22.8	1.59	15	+ 0.68	0.33	29	96
Taieri	80	46.6	+ 0.7	67.8	31.1	6.97	17	+ 4.88	2.83	18	80
Invercargill airfield	0	46.2	+ 0.9	62.8	27.4	8.60	26	+ 4.86	1.15	9	85
Chatham Islands ..	140	52.8	+ 2.2	65.1	37.2	12.27	25	+ 8.82	2.14	17	



CROWN BRAND STOCK REMEDIES

MONEKIL "S"

Sheep Worm Remedy

Sole N.Z. Agents
MACDERMOTT & DUNCAN LTD.
Box 624, Wellington

MANNINGS

PENICILLIN UDDER INJECTION



FOR MAMMITS
in four strengths: 25,000,
50,000, 100,000, 500,000.

PROCAL

Hypodermic
Penicillin,
in Three
strengths:
'100', '500',
and '1500'.



For BLOOD-POISONING, Black-
leg and arthritis in sheep, Footrot
in cows and pigs Necrotic Ulcers
and Arthritis in pigs.

4M2/U.P.



FARMERS! NO MORE FIRE-BRANDING

Brand Your Cattle with

BRAND-EM-OL

The proven Fluid Brand. Used by all
Herd Improvement Associations in
New Zealand.

QUICK — PAINLESS — ECONOMICAL
PERMANENT

OBTAINABLE AT ALL STOCK AND STATION
AGENTS, HARDWARE STORES AND DAIRY
COMPANIES, OR WRITE FOR PRICES AND
FULL PARTICULARS TO —

EBOR SUPPLY CO. LTD.

P.O. Box 594 - - HAMILTON

FARMERS! SAWMILLERS!

here's a complete range of "CLINTON" CHAINSAWS

FOR POWER - ECONOMY - UNBEATABLE PRICES

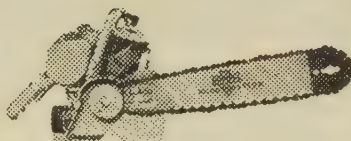
For your guidance the following are main port prices:—

Model 323A (Belt driven) complete with 30in. bar and chain	£102 0 0
Model 577 (Belt driven) complete with 42in. bar and chain	£150 10 0
Model D2 (Woodwhittler) (direct drive) 20in. bar and chain	£73 7 6
Model D3 (direct drive) 26in. bar and chain - - -	£90 0 0
Model D4 (direct drive) 26in. bar and chain - - -	£103 7 6

NOTE.—A file, file holder and depth gauge valued at £4/8/0 are included with every Clinton chainsaw at no extra charge to you. We are proud to advertise our prices for your benefit. When buying demand CLINTON CHAINSAWS for quick starting—easier operation—complete reliability. A full range of spare parts is always available.

Experienced distributors throughout New Zealand. Send coupon for complete details or free demonstration to N.Z. Factory Representatives.

POST THIS COUPON TODAY!



This is the "Mighty Midget" Wood-
whittler complete with 20in. bar and
chain, file, file holder, and depth
gauge. Only £73/7/6

Messrs. Agricultural Cultivators (N.Z.) Ltd.,
P.O. Box 1102, Auckland.

Please send me, without obligation, full details
of the Clinton Chainsaw range and the name of
my nearest distributor.

NAME

ADDRESS

GREATER VERSATILITY THAN EVER!

NUFFIELD

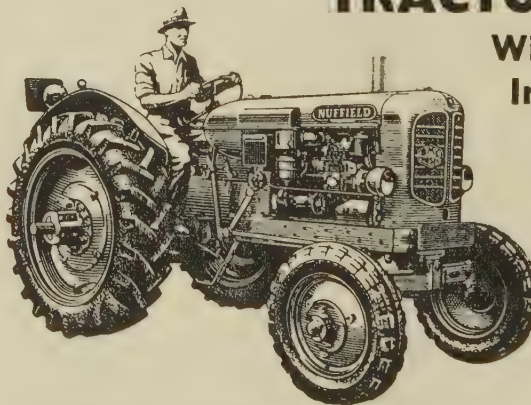
UNIVERSAL

TRACTOR

With NEW
Independent
POWER

TAKE - OFF

(Optional extra)

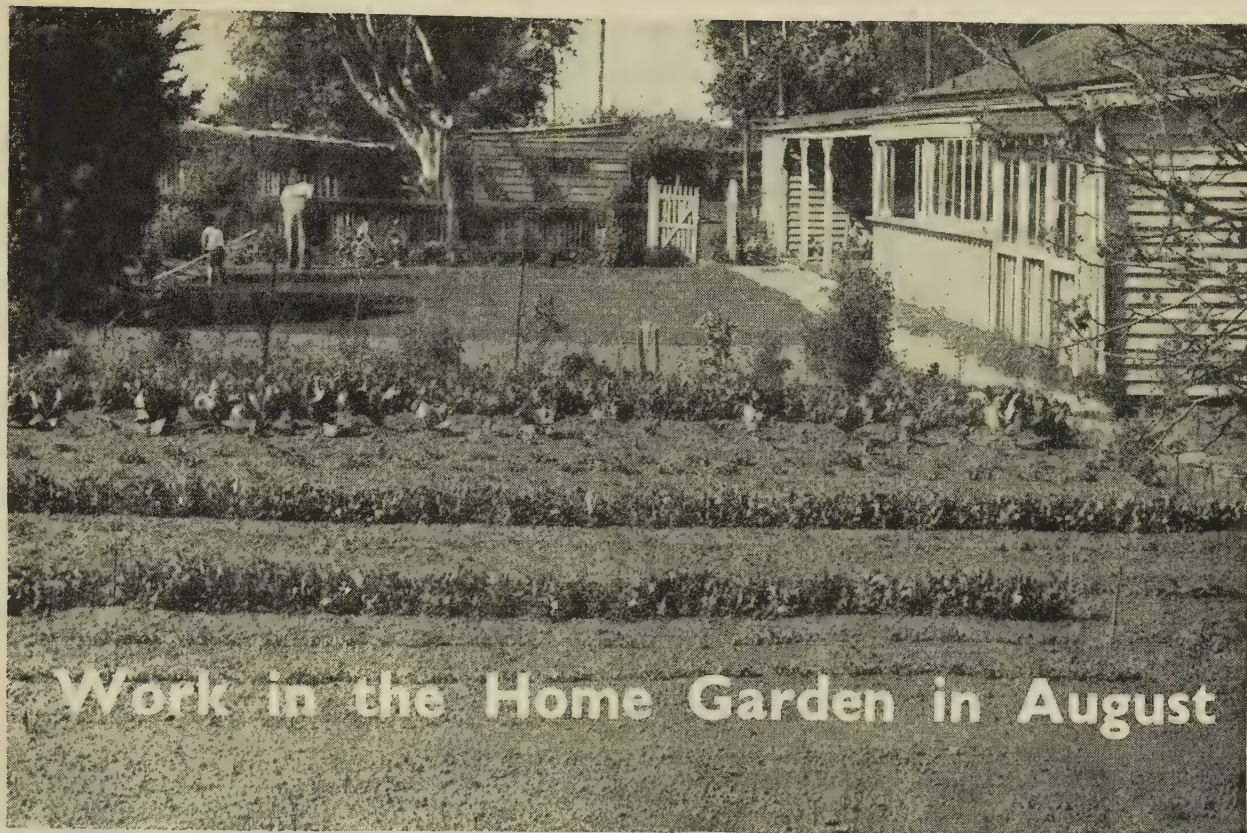


Enables tractor to be
STOPPED, STARTED,
and SHIFTED INTO
ANY GEAR WITH-
OUT INTERRUPT-
TION OF P.T.O.
Operation.

For IMMEDIATE DELIVERY Contact —

THE DOMINION MOTORS LTD.

Wellington, Auckland, Christchurch and Timaru.



Work in the Home Garden in August

By A. G. KENNELLY,

Horticultural Instructor, Department of Agriculture, Dunedin

[Green and Hahn

HARDY vegetables can be sown in practically all home gardens in August, but the extent of sowing should be largely governed by the local climate. In many districts soil temperatures for most of August are below those needed for good growth of many vegetables. For that reason extensive sowings should not be made in most areas until September or October.

TEMPERATURE is one of the most important factors influencing growth. Home gardeners do not always realise that though temperatures may be relatively high at times during sunny days early in spring, the average temperature over 24 hours each day is likely to be considerably lower. As the earth warms comparatively slowly in the relatively brief periods of bright sunshine during late winter and early spring, the soil temperature remains too low in most districts for good growth.

For example, the following are the lowest satisfactory temperatures for germination and growth of plants for which first sowings are often made in August:—

	Degrees
	F.
Spinach and beet	38
Lettuce	39
Beetroot, cabbage, carrot ..	46
Cauliflower, parsley ..	50
Onion, radish	52

A list recently consulted of 21 stations at which earth temperatures are kept for the meteorological service gave average earth temperatures taken during August over a number of years at 4in. deep. For 17 of them temperatures ranged from 36 to 46 degrees F.; for the remainder no temperatures were above 49 degrees F. This is below or on the borderline of satisfactory temperatures for the growth of many plants. Growth is generally very slow at temperatures lower than 46 degrees F. and even the seed of plants which grow well in relatively cool conditions germinates only slowly at 50 degrees. Seed of most hardy plants germinates well at 60 degrees, but seeds of plants such as tomatoes, melons, and cucumbers need a temperature of about 70 degrees to enable them to germinate vigorously.

If seedlings of some plants, notably cabbage, beet, and celery, are subjected to excessively low temperatures for a fortnight or more, premature seed head development (bolting) is

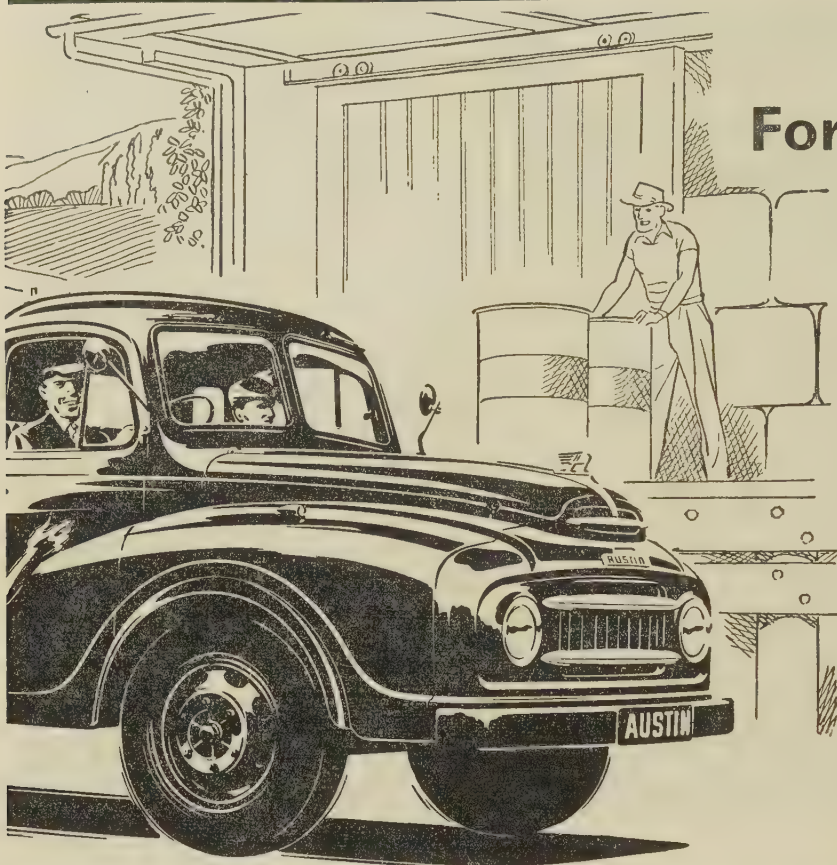
likely. It is not wise therefore to sow too early if there is a doubt about the weather.

Seed Protectants

Limited protection can be given seed by dusting or coating it by shaking it in a tin with a small amount of suitable protectant, though no seed protectant can give complete protection against all soil-borne disease.

Greatest loss of germinating seed is caused by a group of disease organisms known as damping off diseases. These organisms are present in practically all soils and usually thrive under conditions unfavourable for seed germination, such as wet soil and cool weather, which allow them to invade the seed or young plant and cause it to decay. The extent of loss where the seed is coated with protectant usually depends on the degree to which the soil is infected.

Some very effective and relatively new fungicides are now available, such as phygon, thiram, and captan. These may be used as seed protectants instead of the older, more commonly used materials, such as copper compounds. Seeds of beans, beetroot, carrots, cucumbers, lettuces, peas, spinach, silver beet, and tomatoes may be dusted with one of the new fungicides mentioned.



For all Farm work
you can depend on

AUSTIN

TRUCKS, PICK-UPS & VANS

AUSTIN have a vehicle for your every farm need. Their wide range includes 2, 3, 5 and 6 ton trucks available as forward or normal control, 7-tonners with forward control, A40 Pick-ups and Vans; also "152" omnitrucks and omnivans with forward control. Make enquiries today.

Distributors for AUSTIN of ENGLAND —

Auckland: Seabrook Fowlds Ltd. Hawke's Bay: Anderson & Hansen Ltd. Wellington: Magnus Motors Ltd. Taranaki: The Farmers' Co-op. Orgn. Society of N.Z. Ltd. Canterbury and Westland: David Crozier Ltd. Otago: Austin Motors (Otago) Ltd. Southland: P. H. Vickery Ltd.

Were your pastures yellow with buttercup?



Illustrated: Creeping (Ranunculus repens)

Buttercup spreads so fast it quickly reduces carrying capacity, reduces butterfat yields, damages good pasture land. Yet Buttercup has met its match in *Weedone. Weedone '57' or *Weedar M.C.P.4 quickly kills creeping and celery-leaved Ranunculus sceleratus) Buttercup. Weedar M.C.P.4 wipes out Giant Buttercup (Ranunculus acer). See your Weedone Service Distributor. . . . Ask for Technical Sheet T164.

WEEDONE '57'

AND

WEEDAR M.C.P.4.



* R.T.M.



IVON WATKINS LIMITED—NEW PLYMOUTH N.Z.

Zinc oxide may be applied in the same way as copper compounds for treating seed of beetroot, brassicas, carrots, lettuces, onions, parsnips, spinach, and tomatoes. Organic mercury dusts are suitable for seed of brassicas, beet, spinach, and pumpkins, marrows, and similar vegetables. Non-metallic dusts, such as spergon or tetroc, are recommended for pea, bean, maize, carrot, cauliflower, and lettuce seeds. No dressing however, gives more than limited protection, because as a seed germinates and the seedling develops it pushes out more tissue which is not covered by the chemical protectant.

Where temperature, nutrients, moisture, and the physical characters of the soil are favourable for growth the seedling usually grows fast enough to resist the attack of most of the weaker soil organisms, but if conditions are unfavourable for growth, newly developed stems and roots may be invaded and one or more types of stem rot, foot rot, or root rot may develop.

Sowing and Planting

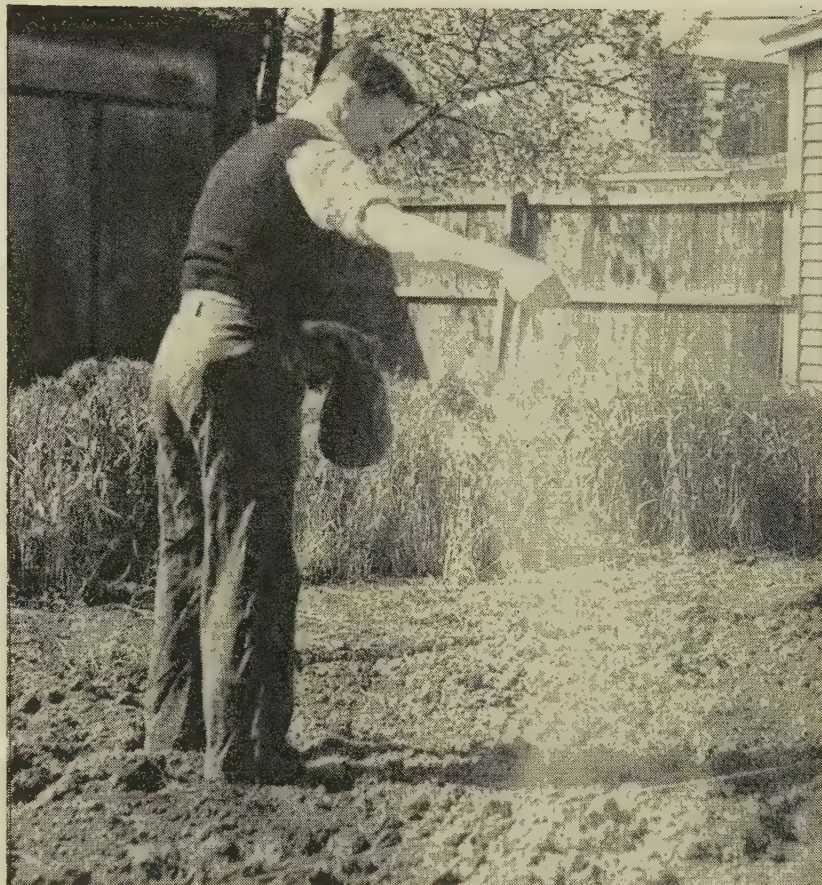
Small sowings of most hardy vegetables can be made in well-drained soils in favourably situated gardens where the ground has warmed enough. Seed of beetroot, carrots, chinese cabbage, cauliflower, summer cabbage, kohlrabi, lettuce, leeks, turnips, radish, peas, salsify, scorzonera (black salsify), spinach, silver beet, and parsley and many other herbs can be sown. Lettuces, silver beet and perpetual or spinach beet, early cabbages, cauliflowers, and onions can be set out in most districts and should mature quickly if strong, well-rooted seedlings are planted in well-manured soil.

In a few districts frost-tender plants such as tomatoes, cucumbers, marrows, pumpkins, and melons can be sown under glass to be ready for setting out when frost danger is past. Though the time taken to produce good plants for setting out varies according to the treatment given, tomatoes started in warm, favourable conditions usually take about 6 weeks from germination and the other subjects mentioned about half that time to reach a suitable state for planting out.

Sowing should be governed by the facilities available and the extent of damaging frost. It is not advisable to have plants ready too early. The date of planting out varies from about mid-October to late October in some northern districts and to the second week in November in many southern districts.

Fertiliser Dressings

August is usually a good time to apply a general fertiliser over the garden. Every year a great number of home gardeners seek advice from the local office of the Department of Agriculture on their cultural problems and request analysis of samples of



[Green and Hahn
Before sowing or planting, the area to be worked can be measured off, marked with stakes or lines, and dressed with a suitable fertiliser mixture.

their garden soil. The charge for analysis is £1 per sample up to 4 samples and the service is intended for commercial growers, as it is most useful for them.

Soil analysis is not usually needed by home gardeners. It is probably true to say that apart from faulty cultural practices, pests and diseases, the use of poor seed or seedlings, or unfavourable temperature, light, or moisture, the trouble in at least 80 per cent. of the gardens from which these samples have been taken is that the soils contain insufficient organic matter.

Nearly all soils could be improved by the addition of organic matter such as rotted vegetation, that is, compost, garden and household residues and green crops, hay or straw, leafmould, rotted sawdust, or rotted animal residues such as animal or poultry manure or fish, meat, or bone wastes. Plants grown in soils rich in well-rotted organic matter are unlikely to suffer from deficiency diseases. Such soils

are easy to work and crops will succeed in them under conditions which would result in failure if the soils were poor in organic matter.

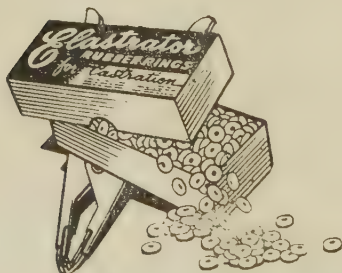
For the highest yields, however, even in soils well supplied with organic matter, it is usually best to apply also the more concentrated mineral or artificial fertilisers. Ideally the home gardener should make up his own combination of fertilisers to suit his particular soil and to suit the needs of the plants he intends to grow. However, this is usually impracticable, as most home gardeners grow a wide range of plants which vary in their nitrogen, phosphorus, and potash needs. There is, too, the difficulty of assessing the nutrient status of home garden soils, which have often had different past treatment in different parts of the garden.

Results are usually satisfactory on soils adequately supplied with organic matter if the home gardener applies a good general or so-called complete fertiliser rich in nitrogen, phosphorus, and potash. One with a ratio of 1:2:1 which is likely to give good results on

For POSITIVE TAILING



- Seal the tail with an Elastrator ring, then immediately shear off the tail a little below the ring.
- This makes lamb tailing positive, bloodless, safe and practically painless.
- For castration of lamb or calf the Elastrator rubber ring is bloodless and unsurpassed.



AVAILABLE FROM ALL
STOCK AGENTS

The
ELASTRATOR CO. LTD.
P.O. Box 226, Blenheim

4 furrow performance in heavy ground

If the work on your farm is tough, here's the tractor that's specially made for your conditions with **EXTRA POWER** for 4-furrow performance and **TRACTIONAL CONTROL** to ensure that power goes into drawbar pull without wasteful wheelslip.

A new tractor in every way, replete with many new virtues, **PLUS** all David Brown's renowned features as standard equipment. See your dealer for details.



TAKES ALL TYPES OF 3-POINT
IMPLEMENTS
Petrol and Diesel Models

DAVID BROWN '900'

**12 MONTHS
WARRANTY**
on all DAVID BROWN
TRACTORS

A model for every need.
Wheel and Crawler. Petrol
and Diesel.

Confidential low-interest
terms. Full range
matched implements.

N.Z. Distributors:
TODD BROS., LTD.,
WELLINGTON.



AT THE SHOW BUILDINGS—JOHN ST.—WELLINGTON.

22nd AUGUST to 7th SEPT.

1957

Open 10 a.m. to 10 p.m.

Planned for your entertainment and
education during the school holidays

- Modern Cafeteria ● Sideshows Galore
- Car Park for motorists ● Amusement for all
- Baby Nursery for mothers
- Fun for young and old

THE LARGEST, MOST INTERESTING FAIR EVER HELD

Popular Admission Charges:—

ADULTS 2/-, CHILDREN 1/-

WELLINGTON SHOW ASSOCIATION (INC.)

SEE

Radio Stars
**JACK
MAYBURY
SELWYN
TOOGOOD**

★
ELFY MORRELL
the famous acrobat who
performs on top of a
90ft. pole.

★
**THE WHITE
YOGI**

fire-eater and sword
swallower.

★
A host of
working models
and
demonstrations

including the latest
Food Preparations and
Home Appliances.

a wide range of soils can be made up as follows:—

	Parts by weight
Blood and bone	7
Superphosphate	7
Dried blood	2
Sulphate of ammonia ..	2
Sulphate (or muriate) of potash	2

Leafy vegetables have a high nitrogen requirement, so that if the above mixture is used as a base dressing for them, it should be supplemented with side dressings of a combined fertiliser with a higher proportion of nitrogen.

Where there is evidence of specific deficiencies further suitable materials can be added, for example, magnesium sulphate (Epsom-salt) for magnesium deficiency and molybdenised superphosphate for molybdenum deficiency, which causes whiptail of cauliflower. Such mixtures can be dissolved and watered on as sprays or side dressings according to which is most appropriate.

Fertiliser Quantities

Commercial growers usually calculate their fertiliser applications at a given number of hundredweights per acre. The more concentrated mineral fertilisers are usually applied at 1cwt. to 2cwt. per acre, mixed fertilisers at 2cwt. to 4cwt. per acre or more according to need, and organic fertilisers such as blood and bone at up to $\frac{1}{2}$ ton to 1 ton, or even more sometimes. Home gardeners can assess comparative dressings per lineal or square yard from the following:—

Broadcasting fertiliser: About $\frac{1}{2}$ lb. per square yard (actually $7\frac{1}{2}$ oz.) equals 1 ton per acre; 1oz. per square yard equals approximately $2\frac{1}{2}$ cwt. per acre (actually $302\frac{1}{2}$ lb.).

Fertiliser in bands: Applied in rows 2ft. 6in. apart 1oz. to $9\frac{1}{2}$ lineal feet of row equals 1cwt. per acre. Applied to rows 2ft. apart, 1oz. to 12 lineal feet of row equals 1cwt. per acre.

Asparagus, Broad Beans, Leeks, Cabbages, Cauliflowers

Asparagus can now be set out. Some notes on its culture, together with seasonal notes appropriate also to August for broad bean, leek, cabbage, and cauliflower sowings, were given in last month's "Journal".

Carrots

Carrots are one of the most important and popular vegetables because of their nutritional value, flavour, and long period of availability, but many home gardeners have difficulty in growing satisfactory crops. Apart from the need of a well-cultivated, highly fertile soil, one reason for the lack of success is that seed does not germinate well in cold conditions and seedlings are likely to damp off owing

to fungous diseases in wet soil. Where drainage is poor and soil conditions are cold, a raised bed is advisable and for convenience in cultivating and harvesting the bed should not be more than about 3ft. wide.

Manuring

Soil heavily manured for the previous crop is best for carrots, and sandy or light loams are especially suitable for early crops. Much experimental work has been done on the manuring and production of carrots and it has been shown that for best results the soil must contain adequate phosphate—usually applied as superphosphate. Generally the application of potash is much less important, at least for early carrots, and only moderate amounts of nitrogen should be needed on most soils.

A fertiliser made up for instance by mixing (by weight) 2 parts of sulphate of ammonia, 8 parts of superphosphate, and $\frac{1}{2}$ to 1 part of muriate or sulphate of potash usually gives good results. On most soils such a dressing should be applied at 2oz. to 3oz. per square yard. Carrots are fairly tolerant of acid conditions, but where a deficiency of lime is suspected it can be remedied on most soils by the application of 2oz. to 3oz. of lime per square yard.

Splitting

Splitting of carrot roots is a widespread trouble and generally is most prevalent in the stump rooted varieties. Wide spacing, which also results

HOME GARDEN

in lower yields, tends to give a greater number of split and coarse roots, as also does excess nitrogen. Splitting is more prevalent in dry conditions and with early sowing or if the roots are left relatively long in the ground.

Soil Conditions

Soil for carrots should be of good texture. If it bakes or forms a crust after rain, emergence and growth of seedlings may be adversely affected. Heavy soils on which growth is comparatively slow tend to produce thick, short carrots with greater core development and inferior table quality than do lighter, more free-working soils.

Trials with some popular varieties, Chantenay for instance, have shown that roots which are accepted as most typical of the variety are produced when the temperature during growth is about 65 degrees F. At 10 degrees lower roots are longer and thinner and at 10 degrees higher they are shorter and thicker.

Carrots vary in shape, colour, and size according to variety, but all these characteristics may be influenced by soil conditions. Soil influences size more than it does shape. Colour, too, varies considerably. The colour most desired by the housewife is usually red or orange-red and is a result of an accumulation of a substance called carotene. Carotene content is higher in some varieties than in others, but is also influenced by temperature and availability of plant food.

Irregular moisture supply and high temperatures bring about the development of a rough surface on the carrot. Horizontal depressions, which may be quite deep, occur on the root and make it wasteful in preparation for the table.

Sowing

Carrot seed should be sown thinly $\frac{1}{4}$ in. to $\frac{3}{4}$ in. deep, according to whether the soil is heavy or light, in rows about 12in. apart. A quarter of an ounce of seed should sow about 100ft. of row.

If the soil is light and free, there should be no need to thin, but on heavier soils young plants can be thinned to about 2in. apart. Thinning should be done preferably when the soil is moist so that the remaining seedlings are disturbed as little as



[Green and Hahn
Kohl rabi is a member of the cabbage family, but is usually treated as turnips and carrots are.

TOPDRESSING

Munro "Triumph" Topdresser

GREAT SAVING!

Cut down on your Topdressing expenditure. No method can compare with Tractor-trailer and the

MUNRO "TRIUMPH" TOPDRESSER

Topdresser attached, as a lime and fertiliser spreader. At 10 miles an hour, an acre is covered in 3½ minutes.

Obviates buying three machines. It will:—

- (1) SOW SEEDS
- (2) FERTILISER AND/OR LIME
- (3) MIX FERTILISERS AND/OR LIME

Send for free booklet!

J. M. McCROSTIE

N.Z. Distributor:
P.O. BOX 67, INVERCARGILL

PLAYING SAFE

Round the Farm . . .



Is like money banked. And 'Tanalised' Timber fence posts, battens, stock yards, gates, stay trim year after year. They're SAFE from borer and rot. (Ask your merchant for the special 'Tanalised' Timber grade for ground use.) Don't take chances on farm upkeep—be sure with pressure-treated 'Tanalised' Timber.

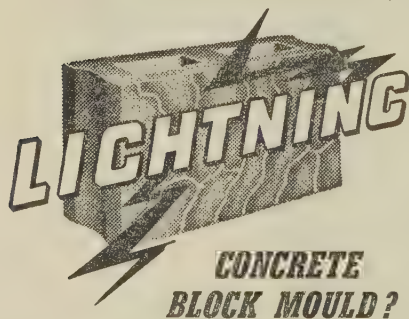
'Tanalised'
pressure treated **Timber**

Available from Timber Merchants.
Full details from:

HICKSON'S TIMBER
IMPREGNATION CO. (N.Z.) LTD.
P.O. BOX 3762, AUCKLAND. TEL. 41-915

BUILDING ?

WHY NOT MAKE YOUR OWN CONCRETE BUILDING BLOCKS WITH YOUR OWN



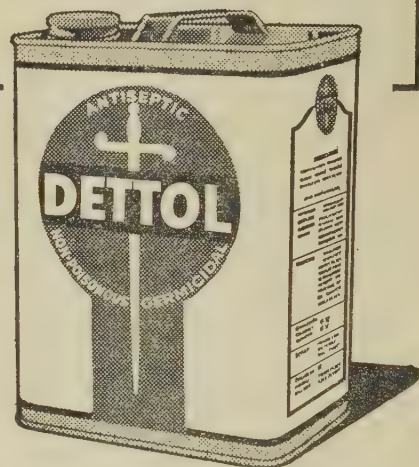
There are two sizes available, the 18in. x 8in. x 6in. for £18/10/0, or the 18in. x 8in. x 8in. for £19/12/6. With one mould you can make up to 100 Blocks per day for that Milking or Implement Shed, Pig House or Cottage.

ILLUSTRATED PAMPHLETS AVAILABLE FROM ALL STOCK AND STATION AGENTS OR HARDWARE MERCHANTS

or direct from H. E. NAPIER LIMITED,
BOX 1555 :: Wellington

Also Available: Lightning Crazy Paving Moulds

The livestock on your farm needs the protection of—



FAMOUS . . .

RELIABLE . . .

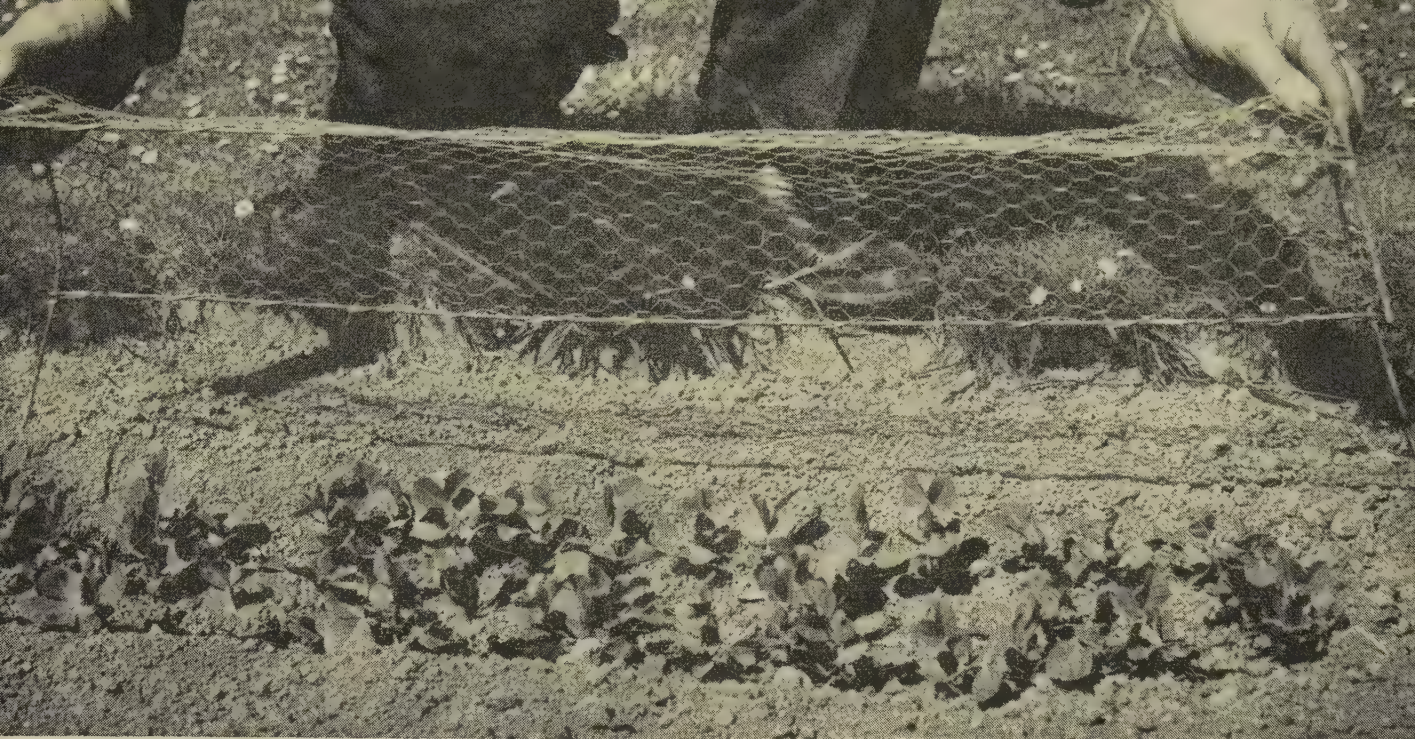
On the farm, for all livestock you can safely rely on the germicidal efficiency of Dettol . . . non-poisonous, non-staining, yet three times more powerful a germicide than pure carbolic acid. Obtainable in ½-gallon and 1-gallon tins from your Chemist, Veterinary Club or Stock and Station Agent.



'DETTOL'

THE MODERN ANTISEPTIC

Reckitt & Colman (New Zealand) Ltd., Pharmaceutical Division, Forth Street, Dunedin.



Peas grow well in the cool conditions of early spring, but the ground should be well drained. Usually peas will have to be protected against birds, such as by the type of wire-netting guard shown. [Green and Hahn]

possible. If thinning is delayed, the thinnings can be used for soups and stews.

Carrot seedlings are delicate and cannot compete with weeds or withstand drying out which may result from baking or cracking of the soil. Cultivation should therefore begin as soon as the rows can be distinguished. A little radish seed, which germinates quickly, is sometimes sown with some of the carrot seed to give an early indication of the position of the carrot rows.

Varieties

Good varieties include Chantenay, Taranaki Strong Top, Nantes, and Morse Bunching. Scarlet Horn is widely used where a quick-maturing carrot is wanted.

Kohl Rabi

Kohl rabi belongs to the cabbage family and many people consider its flavour superior to that of cabbage, as it combines the flavours of both cabbage and turnips. It is treated as a root vegetable, though it is not a root vegetable in the sense that carrots and turnips are. Its bulbous edible "root" is an enlarged stem which forms above the ground.

To secure tender, succulent bulbs kohl rabi should be grown quickly. It should be used before it grows beyond about 3in. in diameter, because if left to reach maturity, it becomes tough and stringy. It grows well in a soil that is well drained and reasonably rich in humus. Though kohl rabi is often classed with turnips, it does

well under a wider variety of conditions; generally its requirements are similar to those of summer cabbage.

Kohl rabi is usually grown as a cool-weather vegetable, but is very useful as a substitute for turnips during hot, dry weather, when turnips are likely to fail, though even kohl rabi should not be permitted to become too dry or it may have a bitter flavour. Kohl rabi is very hardy, but the bulbs do not keep well when stored.

Seedlings transplant well, but it is usually preferable to sow the seed $\frac{1}{2}$ in. deep in rows 12in. to 15in. apart and later thin the plants to stand 6in. to 8in. apart in the rows rather than to transplant them. Plants mature in from 8 to 12 weeks from sowing.

Good varieties include White Vienna, Purple Vienna, and Short Top Green.

Onions

In most northern districts or where it is customary to sow the main crop in autumn, onion plants can be set out 3in. to 4in. apart in rows 12in. apart in August. In most southern districts the main crop is sown in September, but in favourably situated gardens where soil conditions are good a small early sowing may be made toward the end of August.

Peas

Where soil conditions are favourable a sowing of peas can be made in August. A quick-maturing variety, such as William Massey or Little Marvel, is usually preferred. Peas thrive in cool but not cold conditions

and a moist, deeply cultivated, well-drained soil containing adequate humus is best.

Soil preparation should be thorough. The ground should be dug deeply and where necessary organic material such as compost or farmyard manure should be incorporated, preferably some time before sowing, though peas usually do best following a crop that was well manured with organic and inorganic manure.

The addition of superphosphate at 1oz. to 2oz. per square yard has proved beneficial on many of the heavier soils that have been kept in good condition by adequate manuring with organic material or by the digging in of green crops. On the lighter soils a complete fertiliser is likely to give better results. Only moderate fertiliser applications are advised on soils in reasonably good condition. Too-heavy manuring, particularly with nitrogenous organic manures, tends to promote excessive foliage growth and makes the crop more liable to disease.

Lime is essential for peas on most soils. It can be supplied by an annual dressing of 3oz. to 4oz. of carbonate of lime per square yard.

Sowing Seed

Seed should be sown in V-shaped or broad, flat drills, usually drawn out with the hoe. Drills should be 2in. to 3in. deep, except where conditions become hot and dry, when they should be considerably deeper so that, though the seed should not be covered with more than 2in. of soil, the roots will be well down in the cooler and moister soil of the lower levels. This is very

the stripe means something

... in polythene piping too! The **Red Stripe** on "CONTOUR PIPE" identifies it as the most technically advanced polythene pipe on the market. Only **Red Stripe** "CONTOUR PIPE" is **stress-free**. It has even strength—no weak areas.

Only **Red Stripe** "CONTOUR PIPE" is mirror-finished. It has a high-gloss exterior that firmly resists abrasion.

Both features are exclusive to "CONTOUR PIPE" and at no increase in price! When you want the finest polythene pipe, look for the pipe with the bright **Red Stripe** and brand name "CONTOUR" every foot.



Before
UNEVEN TENSION



Now
STRESS-FREE

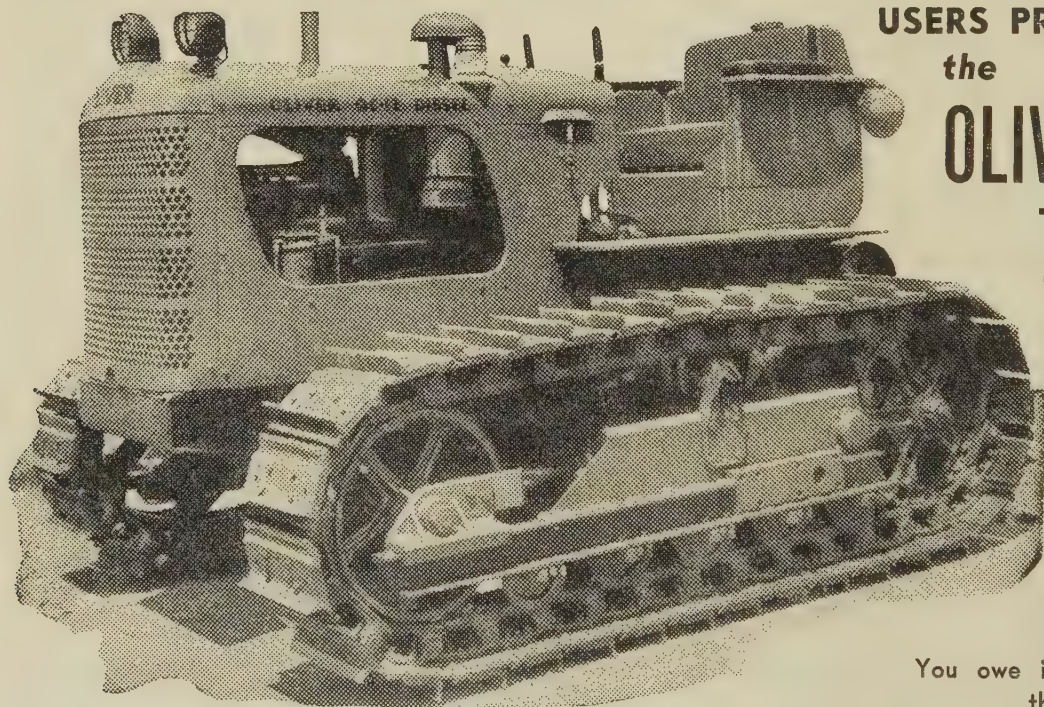
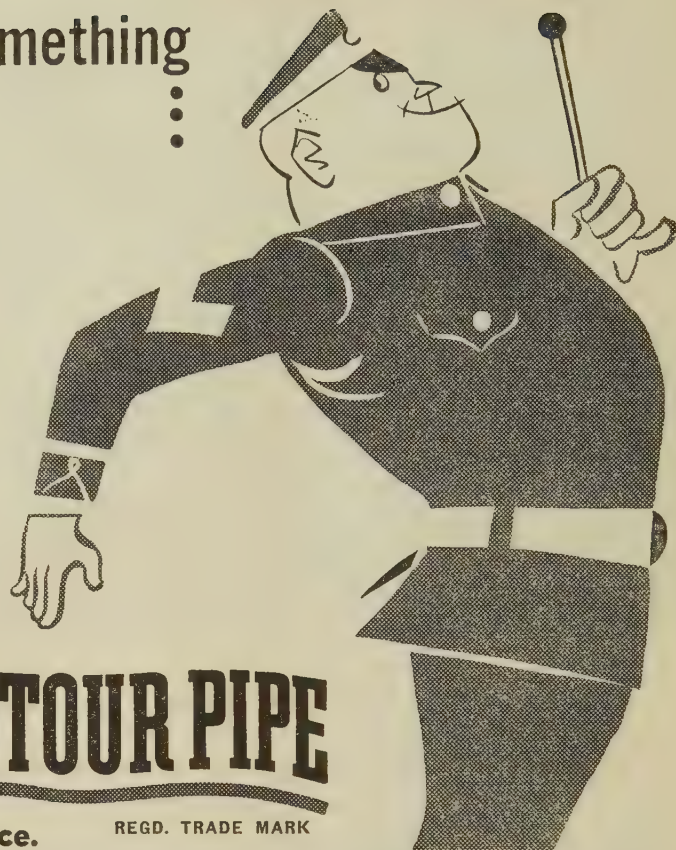
(New) Red Stripe

CONTOUR PIPE



Stress-free, stronger, same price.

REGD. TRADE MARK



USERS PROCLAIM
the

OLIVER OC-12

TRACTOR

Outstandingly Superior
for Giant Discing
and General
Work on Hill
Country.

You owe it to yourself to see
this machine.

FREDERIC W. SMITH LTD.

206 THORNDON QUAY, WELLINGTON.
148 CARLYLE STREET, CHRISTCHURCH.

important where conditions are dry or where heavy wind is likely, as the plants can to some extent be gradually earthed up the stems as they develop. Dwarf varieties should require no other support.

In many districts newly emerged peas must be protected against birds, though birds are mainly troublesome in early spring, when food is scarce and is lacking in variety. Pea guards made of wire netting are most effective, provided the ends are blocked, but they should be removed before the peas become entangled in the wire.

Cotton stretched over the shoots is effective if a number of strands, which may be criss-crossed or stretched in parallel lines, are used. Numerous other methods of protection are effective if well applied.

Rhubarb

August is a good month to establish a new rhubarb bed or to break up and replant an old one. Rhubarb is hardy, easy to grow, and yields heavily if well supplied with moisture and plant foods. The soil should be well drained and preferably well supplied with organic matter. The lighter soils that dry out are less suitable than the heavier, well-drained soils.

In New Zealand varieties can be grouped as early, main-crop, and ever-bearing, though in good soils that do not dry out most varieties can be grown throughout the year. Rhubarb can be raised from seed, which is usually sown in spring as soon as the soil has warmed enough, but to obtain varieties true to name plants for new plantations must be obtained from the breaking up of existing crowns.

Except in especially favoured situations rhubarb should preferably be lifted every 4 or 5 years, as the large roots or crowns tend to become hollow and weakened if undisturbed for longer periods. After lifting, the crowns should be divided with a sharp spade.

Replanting

Single crowns each with a piece of root attached should be replanted. If set with the tops of the crowns about 1in. below the soil surface, plants should develop well in a season. Crowns should be set out 24in. to 30in. apart in rows 30in. to 36in. apart according to the vigour of the variety.

Unless plants are very vigorous, they should not be harvested until the second season after planting. In harvesting, the leaf stalk is grasped near the base and pulled with a twisting motion. Plants should not be denuded of their foliage, nor should they be harvested for too long without an adequate rest period during which a good growth of leaves is permitted to flourish to build up the plants' reserves.

Manuring

Established beds need little attention, but should be kept weed free. Unless the soil is in very good condition, it should be dressed in the dormant season with organic material such as farmyard, stable, or poultry manure or compost. Alternatively blood and bone at 4oz. to 6oz. to the square yard gives good results on soils that are well supplied with moisture and of good tilth.

In addition liquid manure or two or three applications of sulphate of ammonia or dried blood at 1oz. to the square yard may be advisable. However, as early dying down of the leaves and ripening of the crowns are usually important for early and main-crop rhubarb in districts where the top growth dies down, it is not advisable to apply stimulating fertilisers later than immediately after the last pulling.

A neutral to medium acid soil suits rhubarb and on most soils 2oz. to 4oz. of lime a square yard every 2 or 3 years gives satisfactory results.

Rhubarb can be forced by covering the crown with boxes or straw. An early variety should be chosen. Forced rhubarb has less development of the leaf blade and the stalks are more tender and sweet.

Varieties

There are many good varieties of rhubarb on the market and a selection may be made of early, main-crop, and ever-bearing varieties. It is advisable to choose a variety the quality and vigour of which are known to be good.

Shallots

It is something of a tradition among home gardeners that shallots should be planted on the shortest day and harvested on the longest. However, if soil conditions are favourable, shallots can be planted any time from late autumn until early spring.

The keeping quality of different varieties varies. Some start growing much earlier than others, and if held out of the ground, should be planted before they exhaust themselves producing leaves, though usually under good conditions even specimens that have become very wizened will produce a good crop.

Soil and Manure

Shallots succeed in almost any garden soil, but prefer a well-drained, fertile soil rich in well-rotted organic matter. Heavy clay soils that dry out excessively or are poorly drained are least likely to give good results. To avoid the build-up of disease crop rotation should be practised. Shallots should not follow other members of the onion family.

Manurial requirements are moderate and shallots grow well in soils that were heavily manured for a previous

crop. Where additional fertiliser is needed a dressing of equal parts of blood and bone and superphosphate applied at 2oz. to 4oz. to the square yard, according to the fertility of the soil, will usually give good results. In districts of average to high rainfall growth in most soils not recently limed is likely to be improved by carbonate of lime at 3oz. to 4oz. to the square yard, preferably well worked in some time before planting.

Planting

Soil should be cultivated to a fine, friable, tilth and should be firmed. The rows should be marked or drills drawn and the bulbs or cloves, graded in size, should be pressed far enough into the ground to stabilise them, usually $\frac{1}{2}$ in., though deeper planting, even up to the neck, is sometimes preferred.

Bulbs should be set 5in. to 8in. apart, according to the vigour of the variety, in rows not less than 12in. apart. They soon develop roots and as they grow divide into a number of cloves or offsets which remain attached at the base. There is little advantage in planting large bulbs unless a great number of small cloves is wanted. Medium to small bulbs generally do not yield as heavily as large bulbs, but they usually yield more large bulbs.

Shallots can be grown from seed sown in spring as onions are. Seed has not been noticed listed in local catalogues, though it is listed in some from overseas. Such seed, however, is rarely that of the true shallot. Usually it is seed of a small variety of onion, which if left in the ground, goes to seed as other onions do.

Cultivation

After establishment shallots should need no other attention than weeding. If the soil becomes compacted and aeration is restricted, cultivation may be required.

Guide on Spray Materials

A large number of new materials for controlling pests and diseases of plants and trees has become available in recent years, and though many of them are more effective than the older spray materials, it is necessary to understand clearly their specific uses.

For that reason Bulletin No. 390, "Disease and Pest Control in Orchards and Gardens", which has just been published by the Department of Agriculture, should be welcomed. The bulletin, compiled by Dr. H. Jacks, formerly Senior Plant Pathologist of the Plant Diseases Division of the Department of Scientific and Industrial Research, is available free from offices of the Department of Agriculture.

AT LAST — THE PERFECT INFLATION!

THE NEW

UTILITY

UNIVERSAL MOULDED
INFLATION

Made exclusively for
Titchener Noton Ltd.
by Empire Rubber Mills
and available from all
stockists of dairy farmers' supplies.



The only inflation with patented sighting lines to ensure perfect mouth assembly. No rings required. Note mouthpiece.

Moulded with a rugged rubber buffer to protect your teat cups.

• ***FITS ALL TEAT CUPS***

FARM BUILDING CONSTRUCTION— *the TUBEWRIGHTS* *Wool Shed*

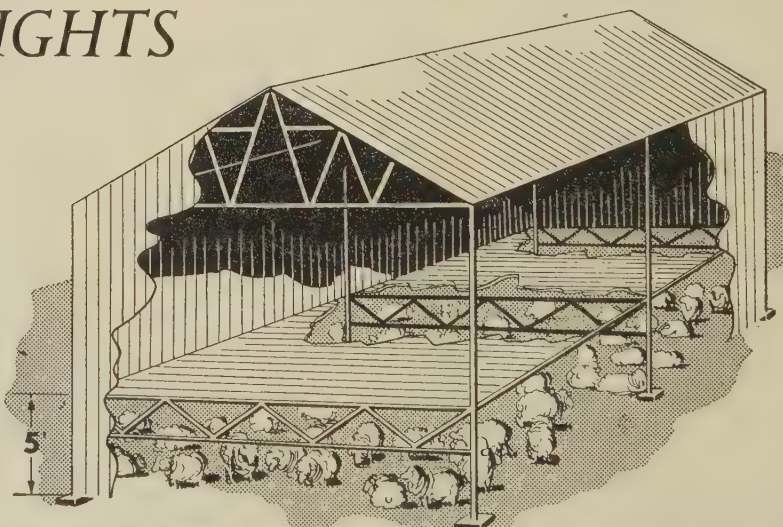
Farmers !

Prepare for a rainy day
—use valuable space
underneath your wool
shed.

Also available:—

Haybarns, Storage Buildings,
Tank Stands, Cattle Stops.

Designed and Engineered by:



TUBEWRIGHTS OF NEW ZEALAND LTD.

REGD. TRADE MARK



Box 151, LOWER HUTT.
Phone 67-662, WELLINGTON

Let us quote to
YOUR SPECIFICATION
without obligation

A Reliable Hive Lid Fastener

By R. G. NAIRN,

Technician, Department of Agriculture Animal Research Station, Wallaceville

MOST beekeepers must take measures to prevent hive lids being blown off by the wind. In this article a cheap, simple, and easily made hive lid fastener is described that proved entirely satisfactory during a year's test under conditions more adverse than are likely to be met with in usual beekeeping practice.

THE use of the fasteners, simply made from a piece of fencing wire, makes it unnecessary to keep hive lids in place by unsightly weights. These

may damage lids and time is wasted in lifting them on and off.

The fasteners can be adapted to fit all types of hive lid and hand hold.

Making Fasteners

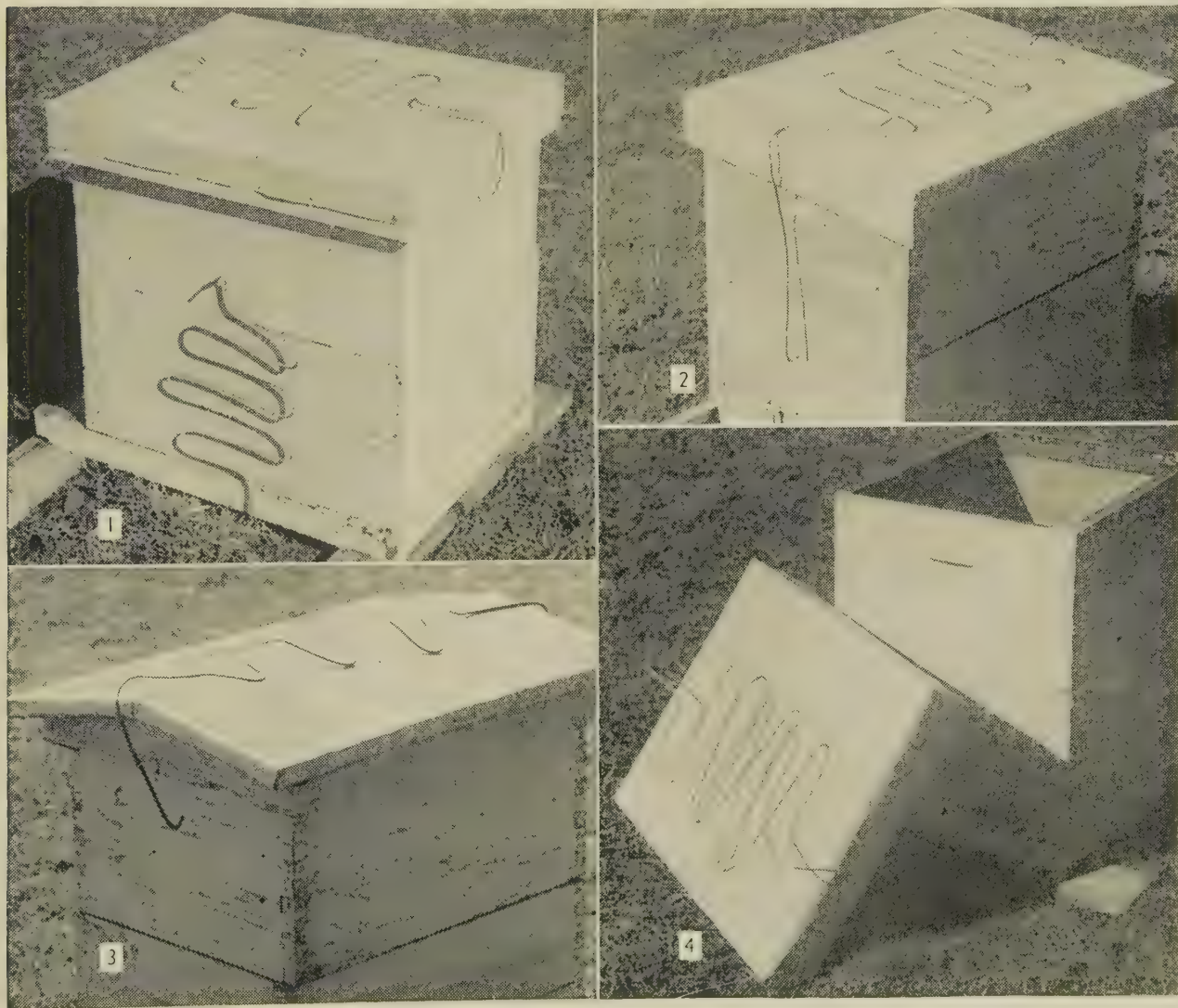
Fasteners can be made in about 2 minutes from No. 8 or No. 9 fencing wire. The only tool required is a pair of pliers for cutting and bending. If new wire is used, the cost is about 2½d. a fastener, but with old wire the cost is negligible.

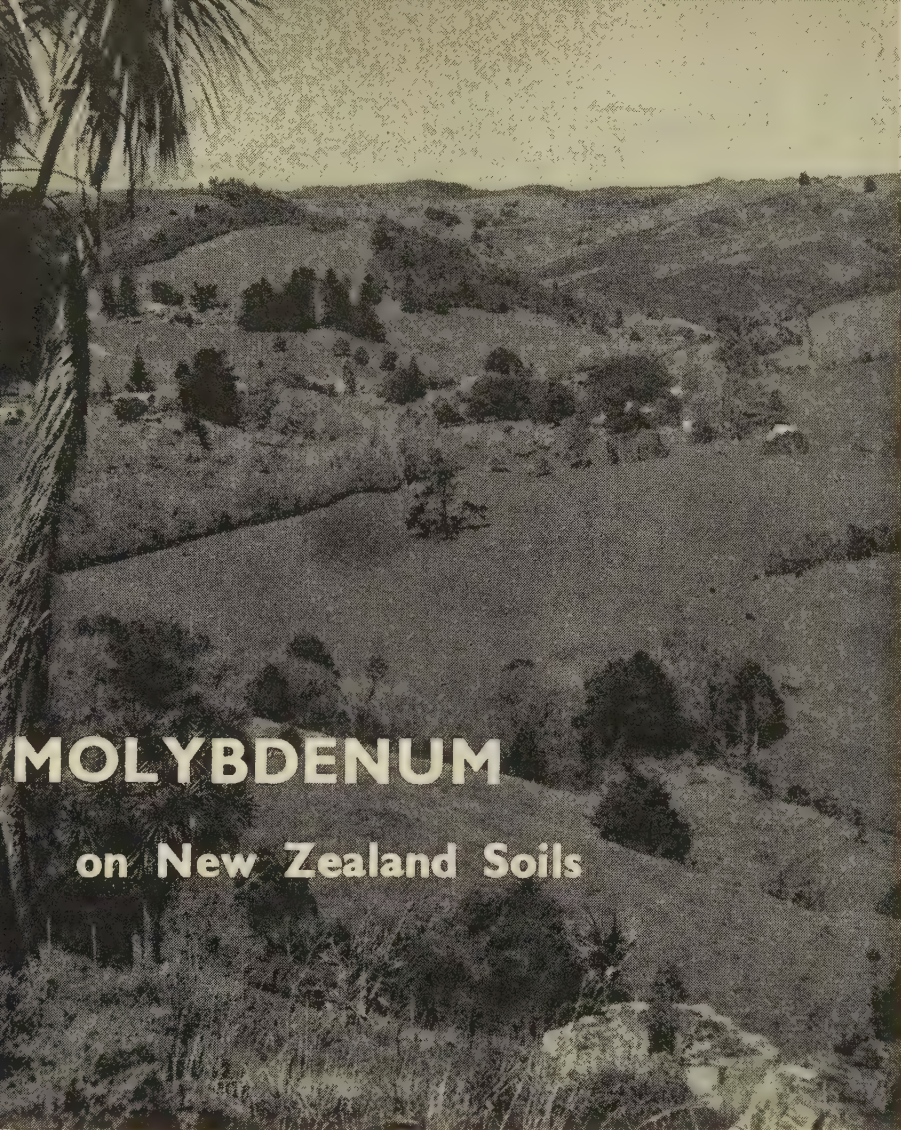
The length of wire necessary to make a fastener for a standard flat type of hive lid is 6ft. 9in. Fasteners have been made with shorter lengths of wire, but their flexibility and adaptability are reduced and they are not so satisfactory.

The cut pieces of wire are bent a sufficient length at each end over the hive lid for them to reach the hand holds, into which they are hooked by 1½in. right angle bends which act as hooks and can be easily bent to adjust the tension of the fastener. Then the wire is bent into folds to extend 5in. out at right angles on either side of its original position. There are three complete folds and the fastener is 10in. across at its widest part.

When made in this way the fastener is flexible and has sufficient tension to keep the lid pressed in position at all times. It can quickly be adapted to all variations in lid measurement and can be detached or placed in position in a moment. A slightly longer wire is required for a gable-type lid.

▼ 1—Fastener in place on roof and also adapted to hold hive body on bottom board. 2—Fastener with slightly longer wire than usual holding loose super in position until the bees seal it down. 3—The fastener can easily be adapted to fit a gable roof. 4—Fasteners need not be removed from lids during manipulations.





MOLYBDENUM

on New Zealand Soils

Clay and Gumland Soils of Auckland Province

THOUGH the element molybdenum was discovered by Hjelm in 1782 and though it was demonstrated to be present in plants in 1900, it was not until 1939 that Arnon and Stout, California, were able to prove that molybdenum is essential for the growth of higher plants. Within the plant molybdenum is thought to have a dual role: It is essential for the conversion of nitrate nitrogen to amino acids (for this reason the nitrogen-fixing clover nodule bacteria are particularly sensitive to molybdenum deficiency), and it seems also involved in the phosphorus metabolism of plants. However, the amounts of molybdenum needed by plants are so minute that the men who first proved it to be an essential element never expected to meet molybdenum deficiency in the field. Since then molybdenum has been found to be deficient in large areas, particularly in Australia and New Zealand. In this article, the first of a series which will appear periodically in the "Journal", N. A. Clarke, formerly Instructor in Agriculture, Department of Agriculture, Kaikohe, C. M. Blick, Fields Instructor, Department of Agriculture, Warkworth, and H. McM. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton, will discuss molybdenum in relation to the sandstone, mudstone, and limestone soils of Auckland Province.

MOLYBDENUM in New Zealand came to notice for the first time in 1945, when whiptail disease of cauliflowerers was found to be associated with a deficiency of this element (1). Subsequently, trials with molybdenum were laid down on pastures; a small response was obtained in Northland in 1945 and later outstanding responses were obtained in North Otago (2).

Molybdenum and Copper

However, though molybdenum is of great value in stimulating growth on deficient soils, ill-considered use of it can lead to poisoning and even death of stock. The toxic properties of molybdenum, however, do not depend on the absolute amount of molybdenum which is ingested by stock, but on the amount relative to that of copper.

← Hill country in the Warkworth district. The soils are derived from banded sandstone (Puhoi suite), and pastures respond outstandingly to molybdenum. National Publicity photograph.

Copper neutralises the toxic effect of molybdenum. A higher copper content in the feed enables the animal to tolerate more molybdenum than if the copper content was low. In addition to this effect of copper, however, other factors, known and unknown, affect the toxicity of molybdenum to grazing animals. For this reason it is impossible, with present knowledge, to postulate accurately pasture levels of molybdenum which are known to be safe. The following may serve as a general guide. If the molybdenum content is below 3 parts per million of dry matter, the feed is safe, unless its copper content is also below 3 p.p.m.; a molybdenum content of 3 to 10 p.p.m. is frequently harmful; and a molybdenum content of 10 p.p.m. and over is usually harmful.

The uptake of molybdenum by pastures after molybdenum topdressing varies greatly with soil types. Hence rates of application which are safe on one soil type may be toxic on another.

Soil Classification

A brief description is given here of the system by which the Soil Bureau, Department of Scientific and Industrial Research, has classified most of the soils discussed in this article (3).

First, soils were grouped by the parent material from which they were derived. This unit or group was called a suite and given the name of a locality where it occurred. For instance, soils derived from greywacke in Auckland Province are in the Marua suite. Within each suite soils are differentiated by their development. The young, steep soils are called immature, the slightly more weathered and leached soils of the easier hills are called semi-mature, and the soils on the undulating and

flat surfaces may be very highly weathered and strongly leached and may be in the sub-mature or mature class. The immature and semi-mature soils are usually brown clay soils and the sub-mature and mature soils are gumlands and pipe-clay gumlands.

Marua Suite

Marua suite soils are derived from greywacke (4). Greywacke hills extend over a large area, particularly in the coastal districts of Whangarei and Bay of Islands Counties. The soils derived from greywacke have not proved easy to farm once the fertility accumulated under the original broadleaf bush has been depleted. They are generally clays with a hard topsoil with little organic matter in it; they dry out rapidly and crack in summer and poach easily in winter, and need large amounts of lime and superphosphate to grow satisfactory pastures. For this reason much of the 300,000 acres of greywacke hill country north of Auckland has gone out of pasture into scrub.

All soils in the Marua suite seem to respond to molybdenum, which can be applied at the recommended rates (2½ oz. of sodium molybdate per acre every 3 to 4 years) without danger to the health of stock. An experiment in the Hamilton district on the steep, immature soils of this suite (Te Ranga clay loam) has shown that 2½ oz. of sodium molybdate with superphosphate is as good as 1 ton of lime per acre with superphosphate.

A similar result was obtained in the Kawhia district on a steep hill soil derived from indurated mudstone associated with greywacke (Marakopa clay loam).

On the more mature soils, heavy clays (Marua clay and Rangiora clay), lime is needed as well as molybdenum to grow good pastures. It is, however, evident that the use of molybdenum will save considerable quantities of lime in these soils. Whereas now 1 ton of lime with molybdenised superphosphate is recommended for pasture establishment, about 2 tons of lime per acre are desirable if no molybdenum is used. Often, however, it was not practical or economic to apply large quantities of lime, and basic slag was used with some success with smaller quantities of lime.

Pastures on the most leached, sub-mature soil derived from greywacke, a gumland soil (Hukerenui silt loam), also respond well to molybdenum. There has been a suspicion of a low copper status on this soil making the application of molybdenum subject to copper topdressing, but this is based on little evidence.

On soils of the Marua suite pasture levels of molybdenum are low on untopdressed fields, but tend to rise a little with topdressing on some of the immature soils (for instance, Te Ranga clay loam). The copper level of the herbage is medium to high on all samples so far examined (5). Farmers have used up to 20 oz. of molybdenum on individual fields without noticeable effect on the health of their stock except that from bloat due to the good clover growth.

Puhoi Suite

The banded sandstone formations giving rise to the soils of the Puhoi suite can be seen at their best in the attractive coastal hills between Waiwera and Warkworth. These sandstones, not all of uniform quality, are the dominant soil-forming materials on that part of the North Auckland peninsula lying east of Kaipara Harbour (Rodney County). They cover about 130,000 acres.

Pasture responses to molybdenum have been obtained on all soil types in the Puhoi suite. On the steep, immature Puhoi clay loam responses have been excellent. In one trial

molybdenum at 2½ oz. per acre gave a growth increase equal to that resulting from 1 ton of lime per acre.

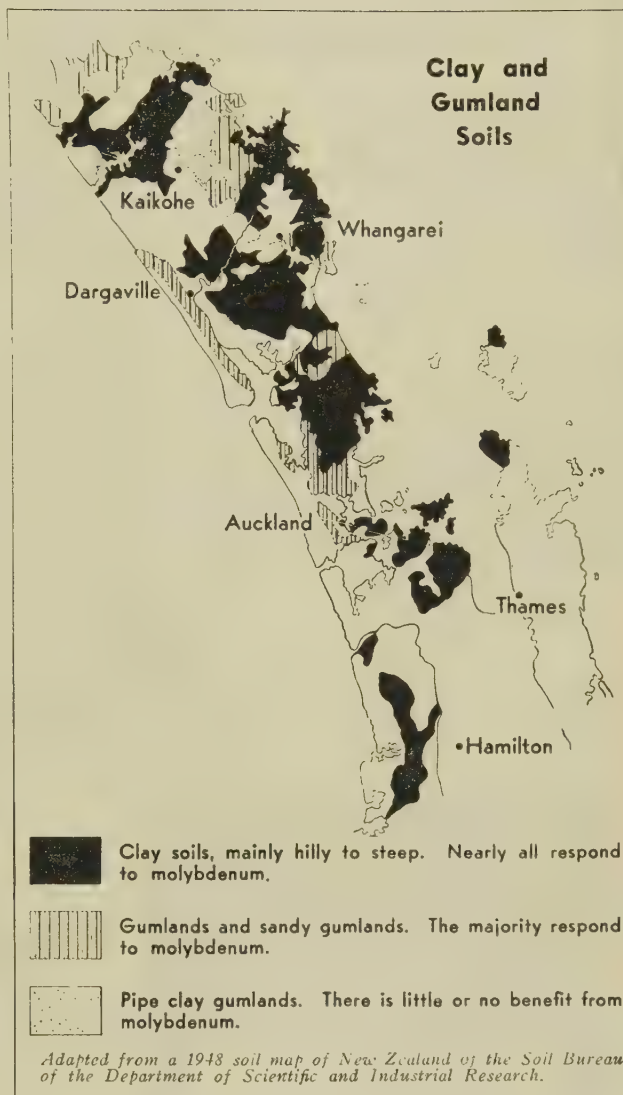
As the application of heavy rates of lime is probably not economical on the steep hills of Rodney County, molybdenum is of great importance to the district. Molybdenum applications with superphosphate convert poor danthonia-browntop-paspalum pastures to 80 per cent. clover swards without oversowing.

Lotus species have been induced to invade areas strongly infested with buffalo grass, and in some areas the strong clover resulting from the use of molybdenum has so improved the palatability that fern has been eliminated from infested faces. There may be some advantage in applying molybdenised superphosphate to shady and dirty faces only at first to encourage

stock to clean up such areas. After the areas are clean the same treatment can be applied to the clean areas. This, of course, would apply to any highly effective medium of improving fertility in a short time.

On the more leached Whangaripo clay loam 1 oz. of sodium molybdate per acre appears highly effective and may be as good as 2½ oz. per acre. As on Puhoi clay loam superphosphate and molybdenum give better results than basic slag, but basic slag and molybdenum are even better than superphosphate and molybdenum. On this soil type 1 oz. of molybdenum per acre has given similar results to 1 ton of lime per acre, but because of the easy topography it is considered advisable to apply 1 ton of lime annually for the first 2 years on unlimed areas which are brought into new pasture

MOLYBDENUM ON NEW ZEALAND SOILS



Unconditional GUARANTEE

Modernite is the most permanent piping ever devised, indestructible under all conditions of normal usage — it cannot corrode, rot or rust, recommended pressures won't burst it, water won't wear it, weather and soil conditions won't crack it.

More than 6000 miles — OVER THIRTY MILLION FEET — have already been laid in New Zealand. 6000 miles of Modernite Pipe, every foot absolutely free from tension, strain and weak spots, giving completely satisfactory service because it is made by the most advanced process used anywhere in the world.

In light and heavy grades and all diameters, together with a full range of rapid-fixing, non-rust compression fittings.

From Stock and Station Agents, Pipe Specialists and Merchants everywhere.

Master Distributors:

A. S. Paterson & Co., Ltd.,
Auckland, Wellington, Christchurch, Dunedin, Blenheim.

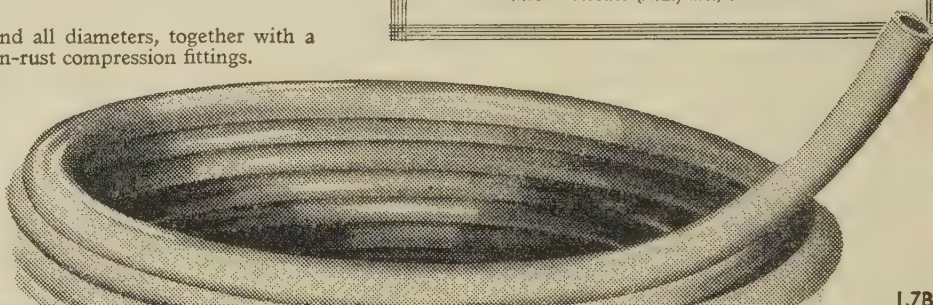
modernite

POLYTHENE PIPE

Guarantee

The makers of Modernite Polythene pipe guarantee it unconditionally under all conditions of normal usage against defects, unsatisfactory service or failure to live up to the claims of this advertisement.

Modern Plastics (N.Z.) Ltd., Lower Hutt.



I.7B

Take the
drudgery
out of
Dairy Shed
cleaning
with



Delak No. 2 is a balanced combination of blended alkalis and the Shell master detergent Teepol. It is designed to give maximum cleaning efficiency under actual operating conditions in milking shed or factory.

Delak No. 2 gives these advantages:

- No mixing or measuring required.
- Easy and pleasant to use.
- Unaffected by hardness or acidity of water.
- Does not lose effectiveness when water temperatures drop.
- Rinses freely, leaving surfaces clean and free from residues.

At all times and in all conditions Delak No. 2 is the best cleaning agent for dairying equipment.

DELAK No. 2

'Delak No. 2' and 'Teepol' are



products.



A view of the Bay of Islands. The hills are formed from greywacke. The soils (Marua suite) are heavy clays of low fertility. Reversion to scrub could be halted by the use of molybdenised superphosphate and a little lime.

On the semi-mature soil, Warkworth clay, experience with molybdenum is limited and the few results obtained are not so spectacular. A quite clear response to molybdenum, however, has been observed on a field which had heavy dressings of lime in the past and where the soil reaction was pH 6.3. Because of the gentle topography of Warkworth clay most pastures on it have been well treated with lime and basic slag, and therefore the opportunities for using molybdenum are limited. Fields which have had basic slag recently are known to respond little or not at all to molybdenum.

Pasture responses to molybdenum on the Puhoi suite range from spectacular on the relatively immature soils of the hills to slight on the more mature soils of the flats. The use of molybdenum is safe for stock provided there is no very heavy liming at the time of application and there has been none in the past. There have been one or two instances of stock trouble following the use of molybdenum on heavily limed paddocks. There is no doubt that the use of molybdenum will greatly increase the carrying capacity of many thousands of acres of hill country in Rodney County.

Waiotira Suite

The massive sandstone formations giving rise to the Waiotira suite are very widely scattered on the North Auckland peninsula. They occur from south of Orewa (not far from Auck-

land) to Kaitaia in the far north. The largest block of land covered by soils of the Waiotira suite is in the Hokianga district; the area is hard to estimate, but is probably not less than 150,000 acres.

Pasture responses to molybdenum have been established on the immature and semi-mature soils, which are found on fairly easy to steep hill country (Waiotira clay loam and Riponui clay), and on the semi-mature and sub-mature gumland soils (Waikare sandy clay and Hukerenui sandy loam). Pastures on Waikare sandy clay are more responsive than those on the less leached Riponui clay or the more leached Hukerenui sandy loam. Pastures on Waikare soils which have had dressings of 2 tons of lime per acre, resulting in a pH of up to 6.0, still showed molybdenum responses in pasture growth. Nevertheless, some trials on this soil failed to give positive results.

Unlimed gumland of the Hukerenui type is responsive to molybdenum, but when lime is applied at higher than 1 ton per acre molybdenum does not usually produce a pasture response. As this gumland soil occurs on flat and undulating land, lime can usually be applied easily and cheaply and its use in moderate amounts, say 1 ton per acre, is certainly desirable. To give a quick start molybdenised superphosphate could be used when new pasture is sown down on fields which have been only lightly limed in the past, but further applications are probably of little benefit.

Both the Waikare sandy clays and the Hukerenui sandy loams are low in available copper. Growth responses to copper topdressing have been observed on Waikare sandy clay. In spite of this, there is no evidence that the use of molybdenum at recommended amounts (2½ oz. to 5 oz. of sodium molybdate per acre) is harmful even in the absence of topdressing with copper. Whole farms have been topdressed with sodium molybdate, and undoubtedly because of the better feed resulting the stock look better.

The most mature soil in the Waiotira suite is the Wharekohe sandy loam. It is a sandy gumland soil, more leached than the Hukerenui soil and with a hard pan which impedes drainage. For this reason it lies wet in winter and spring and tends to dry up in summer. Fortunately, this soil type does not cover a large area. It is an unattractive soil at first sight, but small areas of it are now being developed. There is some evidence that pasture may respond slightly to copper and perhaps to molybdenum, but there seems to be little case for the use of molybdenum if the recommended amounts of lime are applied.

To summarise, the soils derived from the massive sandstone formations found typically in Hokianga County respond to molybdenum, with the exception of the most leached soil of the series, Wharekohe sandy loam, a sandy gumland soil, which, however, occupies only a relatively small area.

Be ready for **MILK FEVER** **IN EWES**



Be prepared for Milk Fever in Ewes (Hypocalcaemia) with PREMTEX, a sterile solution of Calcium Borogluconate for sub-cutaneous injection. PREMTEX is packed in single-dose bottles with rubber cap which is pierced by hypodermic needle when filling, thus protecting contents from contamination. PREMTEX 30 c.c. Injectors and PREMTEX calcium borogluconate are available from stockists everywhere.



Ask for:—

PREMTEX

N.Z. Distributors:

PREMIER PRODUCTS LIMITED

66 DIXON STREET
WELLINGTON

and available from stock firms
throughout New Zealand

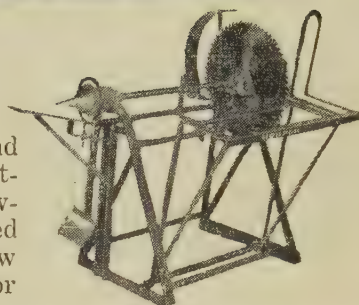


See how the
HOOPER
KUBE log-splitter
makes work easy

HOOPER KUBE LOG-SPLITTER

Saves Time and Labour

Before—a week's hard work on the winter's kindling. Now—one short day's log-shattering blitz. The time and labour saved pays the initial outlay. Fit it on your present saw-bench. Or buy the combined Hooper Kube Log-Splitter Saw bench. Order now or write for further information to . . .



M. J. HOOPER & CO., LTD.

Head Office:
88-90 Federal St., Auckland.
30 YEARS EXPERIENCE IS YOUR GUARANTEE

Engineering Plant:
Henderson.

H7-2

Any way you look at it—



a
'RUAKURA'
MILK FLOW
INDICATOR

GIVES VISUAL,
ACCURATE EVIDENCE
OF "LET-DOWN",
shows clearly:

- ★ ONSET OF
"LET-DOWN"
- ★ ABNORMALITIES
SUCH AS DOUBLE
"LET-DOWN"
- ★ END-POINT OF
MILKING

Consistent use of the "Ruakura" Milk Flow Indicator enables the Dairy Farmer to gain maximum yield in minimum time by giving instant visual evidence of any milking faults.

"RUAKURA" MILK FLOW INDICATORS . . . Price 28/- each

carry an unconditional guarantee for 12 months, and are available from your
MILKING MACHINE MAKER OR SUPPLY HOUSE

Manufactured by Plastic Products Ltd., Hamilton, New Zealand.

Omu suite soils are derived from claystone. They are scattered, often in quite large blocks, right through the North Auckland peninsula. They are an important group in that they include a very large area (300,000 to 400,000 acres) of soils known as clay gumlands and pipe-clay gumlands. The clay gumlands (Waikare clay), usually rolling hills and undulating land, are very responsive to molybdenum, but on the more leached pipe-clay gumlands, recognised by the very chalky, pale-grey topsoils (Hukerenui and Wharekohe silt loam), pastures may respond only slightly to molybdenum if little or no lime has been used in the past.

As the pipe-clay gumlands are naturally very acid, the use of 1 to 2 tons of lime per acre is advised; once this has been applied, however, there is little benefit to be obtained from molybdenum; in fact this element may accentuate a copper deficiency. The Waikare clay, the better-type gumland recognised by its pale-yellow topsoil, better internal drainage, and darker colouring, is also very acid in its original state. In contrast to the more leached soils, however, molybdenum responses in pasture growth can be expected even after 1 to 2 tons of lime per acre have been applied. There seems no danger to stock from the application of no more than 2½oz. of sodium molybdate per acre.

The Omu suite includes also less mature soils of the yellow-brown clay

type, which occur mainly on the more hilly slopes. Only a few field experiments have been carried out on these, but what evidence there is indicates that molybdenum will be of some advantage and can be applied with safety at the recommended rate (2½oz. of sodium molybdate per acre every 3 years).

Omanaia Suite

Omanaia suite soils are derived from sandstone and mudstone. Several thousand acres of these soils are situated between Kaikohe and Hokianga Harbour. Trials with molybdenum have been carried out on all soil types except the semi-mature Wairiki clay loam. Responses have been particularly good on pastures on Autea clay loam. One farm lying on this soil type has raised its production of butterfat by about 40 per cent., which can be largely attributed to molybdenum. Responses to molybdenum have been obtained on other soils of this suite (Whirinaki clay loam), in spite of what is regarded as a satisfactory soil reaction of pH 6.1.

The lime needed for good pasture growth on soils of this group has until now been regarded as about 30cwt. per acre initially, but it has been demonstrated that new pastures can grow well on virgin land if molybdenised superphosphate only is used. Since by far the largest area occupied by these soils is hilly and long haulage on bad roads makes the use of lime on this

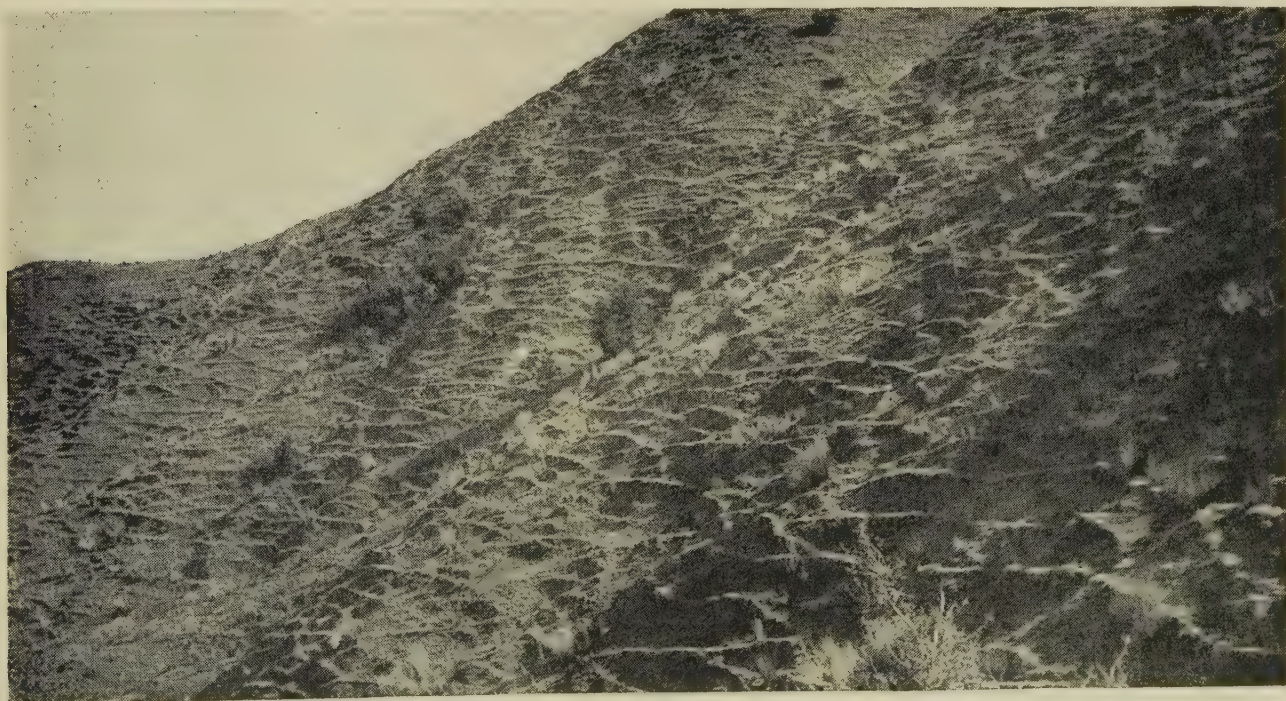
country uneconomic, molybdenum is of great importance. Many farmers on the Omanaia suite, which covers a large part of Hokianga County, occupy relatively small holdings and are financially in difficulties. Their problems can now be largely solved by molybdenum.

Where the country is accessible it is recommended that lime be used at 10cwt. per acre every 4 years and molybdenised superphosphate every 3 years. Sodium molybdate at 5oz. per acre may be better on Autea clay loam than 2½oz. This is a soil on which basic slag was far superior to superphosphate or serpentine superphosphate, but molybdenised superphosphate is giving better results than basic slag.

Maungarei Suite

Maungarei suite soils are derived from dacite, which is not a sedimentary rock but a volcanic rock, but since soils derived from this parent material resemble somewhat those derived from sedimentary rocks, they are included here for convenience.

The largest area of dacite is found along the east coast of the Coromandel Peninsula, where it has given rise to a moderately leached clay soil of good physical structure and high potential carrying capacity (Pukenui clay). Trials on this soil have shown that molybdenum does not give pasture responses and that heavy liming is not necessary.



Steep hills derived from greywacke in the Raglan district. The soil type is Te Ranga clay loam (Maru suite). Molybdenised superphosphate has given much better results than superphosphate without molybdenum.

**CLEANER GRIP—
GREATER TRACTOR POWER**
With

Firestone

**OPEN-CENTRE
TRACTOR
TYRES**



- | | | | |
|--|---|--|--|
| 1.
WIDE
TREADS
<small>(greater Soil
contact)</small> | 2.
TAPERED
BARS
<small>(Wedge-like
gripping action)</small> | 3.
FLARED
OPEN-
INGS
<small>(more positive
cleaning)</small> | 4.
CURVED
BARS
<small>(greater initial
bite)</small> |
|--|---|--|--|

Fit Firestone for outstanding Tractor performance

TI.6A

IN STEP WITH THE MAN ON THE LAND

When the man on the land needs friendly advice on financial matters it's natural for him to call on the local B.N.Z. Manager — a man whose thoughts move in step with his own. Advising on financial matters and helping farmers since the pioneer days has given the B.N.Z. a background that makes sense in terms of farming realities — a very practical understanding of the problems and difficulties the farmer faces. It's sound farming practice to get to know your local B.N.Z. Manager.



BANK OF NEW ZEALAND

The Dominion's Largest Banking House.
Over 360 Branches and Agencies in N.Z.



Near Kaikohe, on the North Auckland peninsula, on the other hand, there are small areas of mature soils derived from dacite regarded as very poor pipe-clay gumland (Parahaki sandy loam). On these soils a fair pasture response to molybdenum has been obtained in one field experiment and in farming practice. Though Parahaki sandy loam is considered to be low in available copper, no indications of stock troubles have been seen in cattle grazing pastures treated with molybdenised superphosphate. As these are only small areas of this soil, it is, of course, possible that this stock had access to fields situated on other soil types high enough in copper to counteract any likely nutrient imbalance occurring with molybdenum-treated pastures on the Parahaki soil.

Whareroa and Waipu Suites

Soils of Whareroa and Waipu suites are soils on alluvial terraces. The response to molybdenum on soils of these suites would no doubt depend on the origin of the parent material. Where soils of this type are derived from the Puhoi suite, the sandstone formations of Rodney County, they are responsive to molybdenum. Other soils of these suites have not been tested, except for one set of plots on Waipu clay. No response was recorded.

Wairama Complex

The soils of the Wairama complex lie in a coastal strip between Raglan Harbour and the mouth of the Waikato River, covering an area of about 100,000 acres. The parent material varies a great deal from sandstones to blue mudstone and limestone. The soils derived from the lime-rich rocks may have dangerously high molybdenum levels, and there has been evidence of stock unthrift on some farms. This unthrift was not caused by topdressing with molybdenum, but by the naturally high levels of this element in pastures, for samples taken from this locality reveal a molybdenum content of nearly 7 p.p.m. (5). Other pasture samples taken from hill soils of this complex showed fairly high molybdenum levels, 2.0 to 5.5 p.p.m. Copper levels of pasture in all cases were medium to high (5).

Though the application of molybdenum can be of marked benefit to farms having sandstone formations belonging to this complex, it could do much damage on the limestone and mudstone formations.

Manurewa and Brookby Soils

The Manurewa and Brookby soils are derived from pumiceous sandstone and soft sandstone respectively. Pastures on these soils respond well to molybdenum, in one case even where the field had been limed to over pH 6.

The area of these soils is not large and they are scattered from near Auckland to Te Kauwhata. In many cases they have been partly covered

. . . MOLYBDENUM ON NEW ZEALAND SOILS

MORE IMPORTANT SOIL TYPES AND THEIR REACTIONS TO MOLYBDENUM		
Soil type	Topography	Reactions
Marua suite (greywacke)		
Te Ranga clay loam	Steep	Very good response to molybdenum, which is an invaluable aid to land development, as application of lime is usually not economic. Good response to molybdenum, but lime is also needed for best results.
Marakopa clay loam		
Moeatoa clay loam		
Marua clay loam		
Rangiora clay	Undulating to hilly	Very good response to molybdenum, but lime is also needed in reduced quantities.
Hukerenui silt loam	Nearly flat	There is only limited evidence, but molybdenum is likely to be safe and of benefit provided it is not applied to excessively limed fields.
Puhoi suite (banded sandstone)		
Puhoi clay loam	Steep	Responses are outstanding, original soil reaction is adequate, and no lime is needed where molybdenum is used.
Whangaripo clay loam	Hilly	Good to outstanding responses lasting perhaps 3 years. Sodium molybdate at 1oz. per acre plus reduced rate of lime is recommended.
Warkworth clay	Undulating	Slight to good response to molybdenum, depending on past topdressing with lime and basic slag.
Waioira suite (massive sandstone)		
Waioira clay loam	Mainly hilly	Good response to molybdenum.
Riponui clay		
Waikare sandy clay		
Hukerenui sandy loam	Flat to undulating	Very good to excellent responses to molybdenum even where 1 to 2 tons of lime per acre have been applied.
Omu suite (mudstone)		
Omu clay	Mainly easy hills	Slight responses to molybdenum on lightly limed pastures.
Aponga clay		
Mata clay		
Waikare clay		
Hukerenui silt loam	Undulating to flat	Very little experimental work has been done. Molybdenum is likely to be of some advantage and quite safe.
Wharekohe silt loam	Mainly undulating to flat	Good responses to molybdenum and no danger to stock from its application. Initial rate of liming: 2 tons per acre.
		Slight response to molybdenum on lightly limed soils.
		No response to molybdenum; pasture usually has medium copper content, but in certain localities copper may be dangerously low (5).
Omanaia suite (mixture of sand and mudstones)		
Whirinaki clay loam	Mainly hilly	Good responses to molybdenum.
Autea clay loam		
Soils derived from limestone		
North Auckland soils	Undulating and hilly	No evidence on effect of molybdenum on pasture growth.
Wairama clay loam	Easy to steep hills	Herbage has naturally high molybdenum content, making necessary the use of copper to prevent damage to stock thrift on some properties.

by water-sorted or wind-blown andesitic ash, so that they occur as a mosaic with volcanic soils.

The soils derived from volcanic ash are usually considerably darker than those derived from sandstone, and in the Te Kauwhata-Pukekohe-Auckland district the following rule applies: Pastures on the dark brown or brown soils of good friability do not respond to molybdenum, but the more greyish clays are very likely to respond to molybdenum provided they have not been limed to a pH appreciably higher than 6.2. Near the coast, however, there are soils developed on mixtures of wind-blown sand and andesitic ash. These may look very much like pure ash soil, but are likely to respond to molybdenum.

Arapohue, Maungaturoto, and Whaka Suites

Soils of the Arapohue, Maungaturoto, and Whaka suites are derived from limestone. There have been no

trials and no information is available about these soils.

Takahiwai Suite

Soils of the Takahiwai suite are derived from reclaimed saline mudflats. Herbage samples taken from Takahiwai clay showed high levels of molybdenum (up to 9 p.p.m.) and medium levels of copper.

Under these conditions molybdenum topdressing and heavy liming are not advisable.

Summary

In the warm, humid climate of Auckland Province pastures on nearly all soils derived from sandstones and mudstones respond to molybdenum provided they have not been excessively limed in the past. The main exceptions to this are pastures on the extremely leached pipe-clay and sandy gumlands, where generations of kauri

stands have led to extreme degradation of the soil.

The larger part of the molybdenum-responsive clay soils are hilly, often steep, and accessible only by long road hauls. Liming has, therefore, not been economic on these soils, and superphosphate without lime has not given satisfactory stimulation of pasture growth. Basic slag was the only fertiliser which gave reasonably satisfactory results, but it has become costly and it is increasingly difficult to obtain labour to apply it. Here recent trials by the Department of Agriculture have shown that in nearly all cases molybdenised superphosphate is more effective than basic slag.

These experiments showed further that on the steep and rather immature clay soils 1oz. to 5oz. of sodium molybdate per acre was as good as 1 ton of lime per acre, and on the easier-lying soils it was still possible to save up to 1 ton of lime by the use of molybdenum. These findings and the advent of aerial topdressing and good prices for farm produce make it possible for private individuals to improve hill country formerly regarded as doomed to revert.

With the use of molybdenum reduced development costs and a guarantee of better results have made the breaking in of easier-lying clay country and gumland soils much more attractive.

There seems to be no danger in the application of molybdenum to those soils recognised to be molybdenum responsive provided they are not excessively limed. However, on certain soils derived from limestone and on very limited areas of reclaimed mudflats herbage may contain naturally very high levels of molybdenum and cases of stock poisoning are known. Pastures on these soils, of course, do not respond in growth to molybdenum. On such soils application of molybdenum or of heavy dressings of lime may accentuate the molybdenum-copper imbalance and force farmers to use copper for many years to come.

Provided molybdenum is used where experience has shown it to improve plant growth, it can be of incalculable benefit to farmers and the country as a whole.

REFERENCES

1. E. B. Davies, "A Case of Molybdenum Deficiency in New Zealand", "Nature", Vol. 156, page 392, 1945.
2. E. B. Davies, G. A. Holmes, and P. B. Lynch, "Pasture Responses to Molybdenum Topdressing in Otago and Southland", "New Zealand Journal of Agriculture", Vol. 83, page 247, 1951.
3. N. H. Taylor, "Pedology as an Aid in Animal Research", "Australian Veterinary Journal", Vol. 28, page 183, 1952.
4. N. H. Taylor and C. Sutherland, unpublished data.
5. I. J. Cunningham, unpublished data.

RADIO broadcasts for farmers will be given during August as follows:—

1YA Auckland, 7.45 p.m.

7 August—"Buttercup, Pennyroyal, and Thistles", by H. McM. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton.

14 August—Talk by officer of the Animal Industry Division, Department of Agriculture, Auckland.

21 August—"Mole Drainage", by D. F. Scott and J. L. Doutre, Machinery Instructors, Department of Agriculture, Auckland.

28 August—Talk by officer of the Animal Industry Division, Department of Agriculture, Auckland.

1XH Hamilton, 12.33 p.m.

12 August—"Poultry Housing Needs", by W. L. Jourdain, Poultry Instructor, Department of Agriculture, Hamilton.

19 August—"Springtime Problems in the Dairy", by M. J. McFetridge, Supervisor of Farm Dairy Instruction, Department of Agriculture, Hamilton.

26 August—"Farm Labour Schemes", by A. E. Riddington, Federated Farmers, Hamilton.

1YZ Rotorua, 7.15 p.m.

7 August—"Young Farmers' Clubs", by Western Bay of Plenty district committee of Federation of Young Farmers' Clubs.

21 August—"Requeening Hives", by D. A. Briscoe, Apiary Instructor, Department of Agriculture, Tauranga.

2XA Wanganui, 8 p.m.

1 August—"For the Countrywoman", by Mary MacDonald.

8 August—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

15 August—"Wanganui Wools Manufactured in Wanganui", a discussion between a Wanganui woollen manufacturer and the Department of Agriculture.

22 August—"Chou Moellier", by G. R. Moss, Fields Instructor, Department of Agriculture, Wanganui.

29 August—"Principles and Practices of Plant Quarantine", by T. N. Flint, Plant Quarantine Officer, Department of Agriculture, Palmerston North.

2YZ Napier, 7.10 p.m.

13 August—"Potato Varieties in Hawke's Bay", by A. J. Coughlan, Fields Instructor, Department of Agriculture, Hastings.

27 August—"Spring Growth and Feed Flavours", by L. W. Scott, Farm Dairy Instructor, Department of Agriculture, Hastings.

2ZA Palmerston North, 12.33 p.m.

5 August—"Care of the Cow and Calf", by J. R. Heawood, Livestock Instructor, Department of Agriculture, Palmerston North.

12 August—"Baled Silage", by J. M. Hopkins, Instructor in Agriculture, Department of Agriculture, Levin.

19 August—"Strawberry Varieties", by G. N. Paulin, Horticultural Instructor, Department of Agriculture, Palmerston North.

26 August—"Chatham Islands", by E. A. Madden, Agrostologist, Department of Agriculture, Palmerston North.

3YA Christchurch, 12.20 p.m.

5 August—"Care of Pre- and Post-lambing Ewes", by L. Wightman, Livestock Instructor, Department of Agriculture, Amberley.

19 August—Review of "The New Zealand Journal of Agriculture" (August issue), by

E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin and 4YZ Invercargill, 12.33 p.m.

5 August—"Seasonal Disease in Sheep", by D. H. Le Souef, Livestock Superintendent, Department of Agriculture, Dunedin.

12 August—"Lucerne Pollination", by L. W. Forster, Apiary Instructor, Department of Agriculture, Oamaru.

19 August—"Oversowing and Topdressing of Hill Country", by S. M. J. Stockdill, Fields Instructor, Department of Agriculture, Palmerston.

26 August—"Care of Lambs", by C. A. Martin, Livestock Instructor, Department of Agriculture, Tapanui.

4YZ Invercargill (following joint programme from 4YA and 4YZ)

5 August—"Aerial Fencing", by W. O. Sly, Soil Conservator, Department of Agriculture, Invercargill.

12 August—"Pasture Mixtures", by W. Faithful, Instructor in Agriculture, Department of Agriculture, Invercargill.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m. ("News for the Farmer").

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month at 12.33 p.m.), Thursdays at 12.33 p.m.

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Tuesdays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.



Farm Building Construction

By H. W. T. EGGERS,
Engineer, Department of Agriculture, Wellington

LAST month's article in this series described various roofing materials. This article discusses the outside sheathing of a building, which is complementary to the roofing in providing total protection from the elements, and also deals with different types of flooring.

TO fulfil their function as a protection from the elements, materials used for sheathing must not only be waterproof in themselves, but they must lend themselves to fixing in a manner that will prevent penetration of moisture at joints to the timber framing. Any such penetration would quickly set up conditions favourable to fungus growth and decay, which consequently would cause rapid deterioration of the load-carrying part of the structure.

Sheathing materials should also have good insulating properties.

Timber frame buildings must be covered on the outside with approved weather-resisting materials. These may be metallic materials, timber, asbestos cement materials, cement plaster or stucco, or brick or concrete veneer.

Timber Sheathing

Timber is the most widely used sheathing material. The hitherto abundant supply of indigenous species particularly suitable for weatherboarding made its almost universal adoption inevitable. Time has established the practice of weatherboard construction securely, but with the

decreasing supplies and rising costs of native timbers alternative sheathings, particularly those using cement and concrete in some form, are being more widely used.

The suitable indigenous timbers are not now so readily available and any prejudice against alternative materials must be submerged. This is all to the good, as most alternative materials available have a much greater degree of permanence.

The recommendations of the "New Zealand Standard Code of Building By-laws" concerning timber sheathing are as follows:—

"Weatherboarding shall be either sawn to not less than $\frac{3}{4}$ in. finished thickness or run from material not less than 1in. thick, and in the latter case shall have a minimum thickness on any reduced edge of $\frac{3}{4}$ in., or two boards may be skew cut from 1 $\frac{1}{2}$ in. thick timber and rebated so as to be in continuous contact with the stud throughout. Boarding of smaller dimensions may be used provided that the outside face of the studs is first closely sheathed with boards of not less than $\frac{3}{4}$ in. thickness.

"Horizontal joints in external boarding shall be either rebated to a depth of 1in. or lapped not less than 1 $\frac{1}{2}$ in.

"If external boarding is placed vertically, the individual boards shall be placed not further apart than $\frac{1}{2}$ in. They shall be weather grooved within $\frac{1}{2}$ in. of each edge and the whole joint covered with a double-grooved 3in. by 1in. batten or alternatively some other approved method of weathering to the satisfaction of the Engineer shall be adopted".

Early forms of weatherboard were rebated on the opposite sides of each edge to give a close-fitting overlap. The rebate on the top edge was finished in a radius to ensure moisture run-off.

This method, known as rustication, can be seen on older buildings.

The newer method is to bevel one side of the board only for approximately half its width. The corner of the opposite edge is also chamfered to help moisture run-off. This method is shown in the diagram on page 67.

The reason for the chamfer on the outside edge of the concrete foundation illustrated in Fig. 4 of the first article in this series is also shown in the diagram. The first weatherboard is fixed with its bottom edge below the top of the concrete foundation. The damp course material may or may not be bent over to come under the weatherboard.

Heading photograph by National Publicity Studios.



There is a grade for every purpose. From heavy framing to the specialised needs of the master joiner, there is a selected grade of Tasman Pine suited to the purpose. Rough sawn or dressed, pressure treated, kiln dried or any combination of these processes, Tasman Pine is available in the size and quantity you need.

BRANDED

Tasman Pine

This happy moment in most family histories is best framed in timber . . . and finished in timber too. But it must be the best. Because a home is the biggest investment most families ever undertake, it has to last! To meet this demand for quality timber fit for the purpose, Tasman, with all the resources of one of the world's most modern sawmills, offers with confidence . . . branded Pine, purpose graded right at the point of production—

TT-6

"Talk it over with your timber merchant"

DEPTH

is no problem with a

GODWIN

deepwell

J3 JET PUMP

ENGLAND'S FINEST PUMP

300 TO 620 GALLONS PER HOUR

The deep well ejector is screwed to suit pressure and return pipes. Conical brass strainer fitted to prevent pressure pipe becoming blocked by foreign matter. The ejector is submerged in the well and is connected to the pump by a two-pipe system. Water drawn into the system by the vacuum developed at the ejector is raised to pump by the energy of circulating water.

The Godwin J3 Jet Pump is suitable for both shallow and deep well work, for pneumatic or open tank use. Model illustrated is a deep well electric system for use where there is a 25ft. to 70ft. lift to pump. Standard operating pressures for this system 20/40 P.S.I.

Units for open tanks also available with Briggs & Stratton petrol engines. Larger units than above also available.

For Fullest Details Contact:

Brown Bros.
ENGINEERS LTD.

Pumping Machinery Specialists
since 1908

590 COLOMBO STREET
CHRISTCHURCH

P.O. Box 548P

Telephone 65-195
(3 lines)

B.42

If the foundations have been carefully finished and the weatherboard is a snug fit to the foundation, this method of construction prevents water running off the walls, under the plate, and down the inside of the foundations. Any cement fillet provided as a sealer between the foundation and the bottom weatherboard is not satisfactory, as the cement shrinks away from the wood, leaving an opening through which the water can penetrate.

All weatherboarding should be primed all over with a good timber priming paint before erection.

Corner Finishing

There are two methods of finishing external corners with weatherboard construction: The boards at the corners may be left square and the corners finished with cover and "scribing" boards or the boards may be joined flush by mitring. Professional builders join by mitring quite satisfactorily, but this is not an easy job for the amateur. When cover and scribing boards are used the cover boards are placed first and a 2½ in. or 3 in. by ½ in. batten is scribed to the profile of the weatherboard and after being cut out is securely nailed to the edge of the cover board, thereby entirely enclosing the corner.

For finishing internal corners the boards on one side may be finished square and carried beyond the corner to the depth of the weatherboarding. The boards of the mating wall must be cut on an angle to be a close fit to the corresponding boards with which they mate. Alternatively internal corners may also be mitred. To ensure watertightness on internal corners exposed to driving rain it is a good plan to flash behind the corner with metal flashing carried down to below the lower edge of the bottom board.

Weatherboarding should be carried up near enough to the top plate to be well inside any soffit provided under the eaves or, in gable ends, to be a close fit under the roof overhang. Alternatively gable ends can be finished with a cover board under the roof overhang, and in a tiled roof it can be finished with a scribing board to the profile of the tiles.

Asbestos Cement Materials

Asbestos cement sheathing is available in two types—flat sheet and "sidings".

Flat Sheet

Until recently flat sheet was available in relatively thin sections only and possessed no structural strength. This necessitated construction of the framing so that no stresses were placed on the sheathing, any movement of the framing being countered by close spacing of studs, bracing, and adequate dawning.

With the availability of thicker sheets and their ability to resist some stressing, close spacing of studs is no longer necessary and the thicker sheets

can be supported with much less dawning, as they constitute "structural panels"; that is, each sheet has some inherent strength which can be considered as a contribution to the strength of the building as a whole.

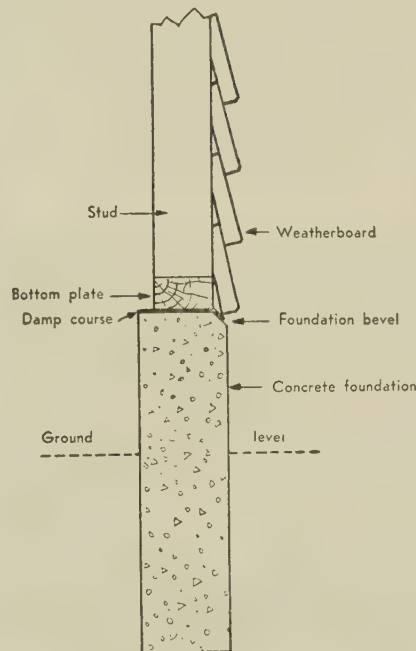
Because of its relative thinness flat sheet asbestos cement should not come into direct contact with the woodwork to which it is fastened, a layer of asphalt-saturated fabric being interposed.

All joints must be made over a framing member, and horizontal joints must be sealed either with a horizontal cover mould of the same material or metal flashing. All joints should be covered with cover battens made from the same material; wooden battens are not satisfactory, because decay can start from the inside through the penetration of moisture.

It is good practice to seal all joints with a suitable sealing compound before cover battens are placed.

Asbestos cement sheet is very convenient for using as flat soffit under eaves and is available in strips specially cut for this purpose. Internal and external angle mouldings are also available for finishing and providing weather seal at corners.

Flat sheet and all accessories can be fixed by nailing. Flat-head galvanised nails should be used and if nails are placed near the edges of sheets, it is preferable to drill the sheet to accommodate the nail. Battens or mouldings should always be drilled to accommodate the nails.



Method of fixing bevel-back weatherboarding at the bottom of a stud and at the top of concrete foundations.

Sidings

Sidings are virtually asbestos cement shingles 1ft. wide by 2ft. long. They are manufactured with a cedar-grained surface and have a wavy lower edge; they are a natural white as at present manufactured, but coloured sidings should shortly be available. As a sheathing they are pleasing in appearance and very adaptable for renovating over existing timber, sheathing being fixed either direct or with furring strips according to the type of weatherboarding.

On new construction sidings are fixed to battens nailed to the studs, a layer of asphalt-saturated fabric being placed between the sidings and the battens. Where sidings are liable to damage near the ground a middle batten is placed between the supporting battens for the first few rows as a safeguard against breakages.

There are two methods of fixing sidings each regulated by the width of the waterproof fabric underlay. If a narrow underlay is used, each layer overlaps not only the lower layer of underlay, but also underlaps the row of sidings immediately below. If a wide underlay is used, backing strips of the same waterproof fabric are placed under each joint. Either method constitutes a first-class sheathing.

Cover mouldings, flashings, and all accessories are available to ensure that the finished sheathing will contain no moisture traps, which provide lodgment or entry of moisture to the timber framing.

The illustrations on page 69 show a farm building before and after being sheathed with sidings.

Cement Plaster or Stucco

Cement plaster must be done by a skilled plasterer if it is to be effective. Because of shrinkage while curing improperly prepared or worked plaster is likely to develop hair cracks which form moisture traps.

Plaster requires a backing which may be either rigid or non-rigid, depending on the method of construction. The backing must be attached to the studs with galvanised nails or clouts and must be either waterproof or covered with impregnated building paper.

Rigid backing may be cement wall-board made for the purpose not less than ½ in. thick, asbestos cement sheet, or close boarding with timber not less than ½ in. thick or more than 8 in. wide.

Non-rigid backing must be waterproof building paper or felt of approved type.

Stucco with non-rigid backing must be reinforced with metal lath or galvanised wire mesh not greater than 2 in. mesh or less than 16 S.W.G. or with galvanised wire netting not

"Paint it with

LUSTAR

and you'll double its life!"

That goes for gates, yards, fences, buildings, trailers, implements, silos, horse-, cow-, and stack-covers, tarpaulins, etc., etc.

Since first marketed in 1944, Lustar has made firm friends all over New Zealand, because of its simplicity in use, and reliable performance. Lustar Improved Tar-Base Paint is equally good for metals, timbers (including pinus), or fabrics. In black only: Gallons 25/-, 4-gallons 80/-, 45-gallon drums (railage free) £30.

Order from your Stock Firm or Hardware Dealer.

N.Z. Distributors:

McGill Agencies, Box 1507, Wellington.



CANNOT ROT — RUST —
WARP — BURN — OR SPLINTER

Available from
LYTE Stockists in your town

Manufacturers:

LYTE LADDERS (N.Z.) LTD.

P.O. Box 790, 56 Victoria St., Wellington.
L2.57

CUT SUBDIVISION COSTS!

Enquire now about

THE HUNTER FENCING SYSTEM

Write for illustrated leaflet to:—

BETHUNE & HUNTER LTD.,

P.O. BOX 2637, WELLINGTON.

Ship via London

The PORT OF LONDON AUTHORITY

A Self-governing Public Trust for Public Service

London—the Premier Port of
the Empire—equipped for all
types of ships and cargoes.

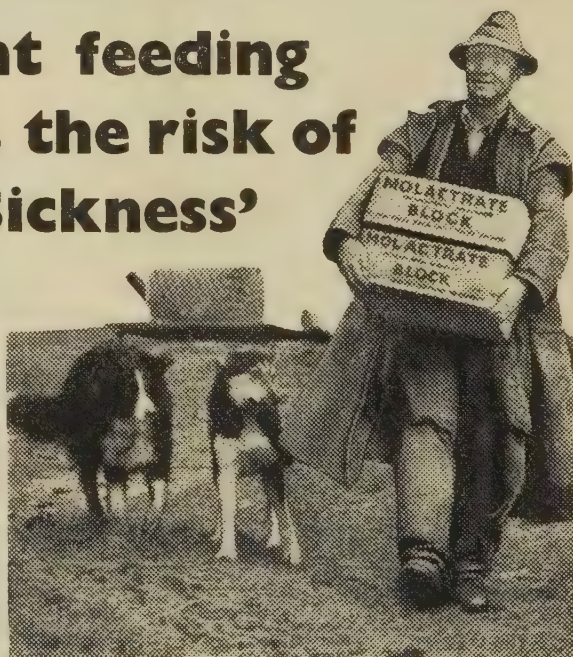


For full
particulars apply to:
Mr. W. C. Perkins,
22 Loftus Street,
Sydney.



The right feeding removes the risk of 'Sleepy Sickness'

Thousands of sheepmen have
proved that the right feeding
at the right time is the
certain way to banish this
nutritional disease from your
flock. Feed Molactrate to
the in-lamb ewe, for from 4
to 6 weeks before lambing.
Save your ewes and your twin
lambs . . .



Feed MOLACTRATE PROTEINISED MOLASSES BLOCK

Write for Free Leaflet to
W. & R. Fletcher (N.Z.) Ltd., Box 594, Wellington.

G9371

greater than $\frac{3}{4}$ in. mesh or less than 19 S.W.G.

Reinforcing should be stretched tight and fixed not less than $\frac{1}{4}$ in. or more than $\frac{3}{4}$ in. clear of the backing material by the use of special furring nails. Alternatively self-furring lath may be used. Joints in reinforcing should be lapped at least one mesh and should not be made at angles, where the reinforcing should be doubled for at least 12 in. each side of the angle.

Diagonal reinforcing at least 12 in. by 18 in. should be fixed on all corners of openings. Nail spacings should be not more than 6 in. along studs and dwangs, and joints should be lashed with 20 S.W.G. galvanised binding wire.

All openings should be adequately flashed with metal flashing.

Sand-cement ratio for plaster should not be less than 3:1 by volume and a suitable waterproofing material should be added. The addition of a little lime, not more than 1/10 part by volume, helps to produce a "fat" workable plaster.

The thickness of stucco, which must be applied in two coats or more, should, on non-rigid backing, be not less than 1 in. or more than 1½ in. On rigid backing these thicknesses can be reduced to $\frac{3}{4}$ in. and 1 in. respectively.

Brick or Concrete Veneer

Wall veneer applied as sheathing to a framed structure consists of a brick or concrete wall, not less than 4 in. thick if unreinforced or 3 in. if reinforced, resting directly on the foundation.

A space of at least 1½ in. must be provided between the timber frame and the veneer, the veneer walls being attached securely to the frame by non-corrodible ties, two to each square yard of wall.

With veneer sheathing the walls should be braced at intervals of not more than 16 ft. by adequately braced cross partitions or alternatively the roof should be so braced as to provide strength equivalent to that given by such cross partitions.

Non-corrodible flashing should be built into the veneer where necessary to prevent moisture from penetrating and the veneer walls should not be more than 12 ft. high above the top of the foundations.

Standard Code Recommendations

The Standard Code concerning wall sheathing recommends:—

"All exterior walls shall be covered on the outside with approved weather-resisting materials.

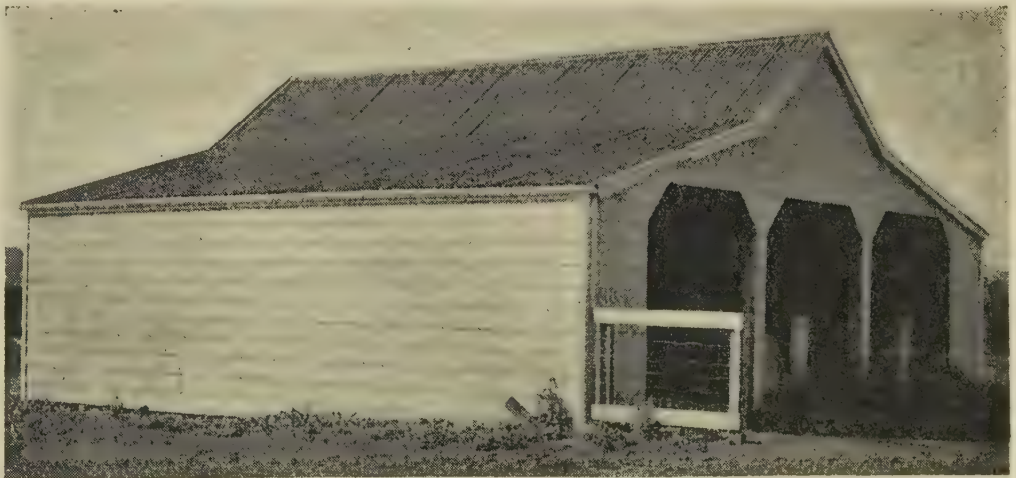
"Under all external timber wall coverings in buildings intended for human habitation building paper or other approved waterproof material shall be fixed to the outer faces of the external studs or to the sheathing. At horizontal joints the paper shall be lapped at least 2 in. and at perpendicular joints at least 6 in. and the waterproof material shall be lapped over

FARM BUILDING

and under all flashings to the extent necessary to exclude moisture".

As the function of the roof and sheathing of a building is to provide adequate protection from all weather, the area covered by the building must be so enclosed and protected that no moisture can penetrate through or round the outside coverings. Joints must be provided with adequate lap or sealing, and window and door openings must be adequately flashed or otherwise protected so that the whole exterior sheathing effects a quick run-off for moisture without pockets or unprotected areas through which moisture can penetrate.

A case was experienced by the author in which an outside door facing the prevailing wind, though in itself adequately sealed and protected from driving rain, permitted a large quantity of water to be driven through



Upper—An implement and storage shed in its original sheathing of weatherboarding. Lower—The same shed after the weatherboarding had been covered over with sidings. Sparrow photo.

FOR SPEED

PACK GOODS IN
EASILY
HANDLED

JUTE BAGS

The textured surface, the positive 'grip' of jute bags makes for faster, surer handling, more stable stacking by men or machines in all weathers. Jute bags are stronger — more practical and satisfactory for a wide range of goods — reusable — resaleable — and, most important, they cost you less.

Inquiries to
INDIAN JUTE MILLS ASSN.
P.O. Box 90, Dunedin.



**RENOWN
Pumps**
are used EVERYWHERE!

MANUFACTURED BY:— over 30,000 in daily use.
W. H. PRICE & SON LTD.
34-36 MANCHESTER ST., CH'CH. P.O. BOX 1084.

Experience tells me—



ELTHAMOL
VETERINARY OINTMENT

is REALLY EXCELLENT for
CHAPS —:: CRACKED TEATS —:: BRUISED UDDERS
Sold in 2, 10 and 36 lb. tins—for economy buy the large size.
Prepared under strict laboratory control, by the
N.Z. CO-OP. RENNET CO. LTD., ELTHAM
and obtainable from Stock and Station Agents and Dairy Factories.

the latch keyhole, the protection of which had been overlooked. A simple shield provided a solution to this problem.

Though the roof and sheathing in themselves provide protection for the enclosed area the accessories, such as guttering and downpipes, also play an important part in ensuring quick run-off of moisture. With adequate guttering run-off from the roof is kept away from the wall sheathing, thereby saving it from an extreme condition of service which would virtually amount to total submersion. Sheathing, like any other material, if not subject to extreme conditions has a much longer life, and it is therefore in a building owner's interest to ensure that adequate means of roof water channeling is provided and maintained.

Joints in weatherboarding, which is subject to working due to temperature and humidity changes, are not very satisfactory, particularly at corners, if sealed with ordinary putty. Mitred corners may be sealed with sheet metal "soakers", but butt joints are unsightly if sealed with a cover plate. As ordinary putty dries hard and cracks with the working of the timber, a non-hardening sealing agent is much more satisfactory. It remains elastic and fluid enough to allow for any working of the timber without cracking. Proprietary lines of this type of sealing agent are available from most hardware stores.

Of the four ways of sheathing mentioned above, the first two can readily be used by the amateur, as no trades skill is required for sheathing either in timber or asbestos cement products. Sidings can be easily fixed if instructions available from the suppliers are followed.

The last two methods, plaster and veneer, require trade skill to apply satisfactorily and are beyond the scope of the amateur builder.

Joinery in External Walls

As joinery (windows and doors) used in building construction requires machinery for its manufacture, all joinery is best supplied to requirements by a joinery manufacturer. Joinery is essentially a factory product and arrives on the building site marked and ready for installation. Windows and doors are supplied complete with frames and (if hung) hinges; the frames are temporarily battened to keep them square and all glazing is usually complete.

All that is required is the fixing of the frames in the openings left in the sheathing to accommodate them and, after flashing and weatherproofing have been completed, the fixing of the appropriate movable sections in accordance with the marking.

The battens holding frames square should not be removed until it is certain that the fixing is sufficient to prevent distortion; additional fixing may be done after removal of the battens provided the frames are

packed between the supporting vertical and horizontal framing members so that distortion is prevented.

The steps of external door frames and the sills of windows are usually left unchecked at the ends where they overlap the outside sheathing. This checking must be done on the site for each door or window, as the protrusion of the step or sill beyond the sheathing may be different in each case. This is particularly so with weatherboarding, where the checking must be angular to suit the slope of the weatherboard. This checking presents no difficulty and can be done accurately by measurement.

Door frames must be flashed above and window frames both above and below. The under side of sills and steps can be sealed with quarter-round beading. Outside cover boards, if they are part of the frames supplied, must be sealed to the contour of the sheathing with scribing boards, as described for corner finishing for timber sheathing.

FLOORING

Floors of farm buildings may be of earth, concrete, or wood.

As an **earth floor** does not depend on foundations for its support, it can carry any superimposed weight within the load-carrying capacity of the soil. Its great disadvantage is dust and, unless it is sealed, it would be unsuitable for general buildings.

Earth floors can be sealed satisfactorily with emulsified bitumen and so treated form very good floors for implement or general storage sheds.

A **concrete floor** may be either cast on the ground and finished against the foundation wall of the building or form a monolithic structure with the building foundations and its own supporting columns and beams with reinforcing bonded throughout.

For normal service a concrete floor of 4in. thickness or more cast on the ground does not require reinforcing and will carry any load per unit area within the load-carrying capacity for the same area of the soil beneath it, which must include both dead and live loads.

If, however, it is subject to concentrated loading higher than the load-carrying capacity of the soil, reinforcing will bring the load per unit area within safe limits.

Where a concrete floor is built continuously with the foundation and its own supporting columns and beams special design is required, consideration having to be given to loading and the conditions of service.

Wood is still the principal material used for supported floors and is used almost universally in farm buildings.

Though the floor-boards carry the superimposed load, their strength or load carrying is not taken into account when the floor joists and floor supports are being considered. The floor sup-

ports and foundations must be adequately proportioned for the floor loading. For example, the floor of the fertiliser store illustrated in the second article in this series is supported on 6in. by 2in. joists resting on 6in. by 4in. sleeper plates which are supported on close-spaced, adequately proportioned piles.

This floor is much stronger than would be required for say a dwelling, as it is proportioned to carry 60 tons of fertiliser, which would impose a distributed load of 500lb. per square foot, whereas a distributed load of 60lb. per square foot is permissible in dwellings. The floor timber for both these loadings can be standard tongue and groove floor-boards of ¾in. thickness.

When timber flooring is being laid it is advisable to start on one side of the building with a full width board, clamping the boards tight with floor clamps before they are nailed. If this is done for every room on the same side of the building, and clamping is carried out evenly, boards will mate satisfactorily where the flooring passes through doorways at right angles to the direction of the boarding. This condition applies only to the same mill run of flooring, as different runs may have slight variations in board widths; to avoid these variations all flooring for any building should be ordered at one time.

In buildings with a central passage it is a good practice to start laying the flooring from the centre and to work out to both sides, as clamping or timber discrepancies will not be multiplied to the same extent where the flooring passes through doorways.

Nails should be punched as nailing proceeds, because some nails can be easily missed if punching is left until the whole floor is laid.

Floor Coverings

Basic flooring as described above will require covering suitable to specified uses of buildings.

In a woodshed, where protection from the elements is the main requirement, an earth floor is quite satisfactory. In a garage, store, or implement shed, where dust and dirt must be avoided, the earth floor can be sealed or paved with either bitumen or concrete. If the building is a store in which floor dryness is essential, a concrete floor can be sealed either during laying with a sandwich waterproof membrane or after laying with a bituminous covering. Alternatively an above-ground timber floor can be used, sub-floor air circulation ensuring dryness.

For dwellings or buildings where good insulation as well as dryness is

(Continued at foot of page 72)

Tractor Wheel Equipment for Swampy Ground

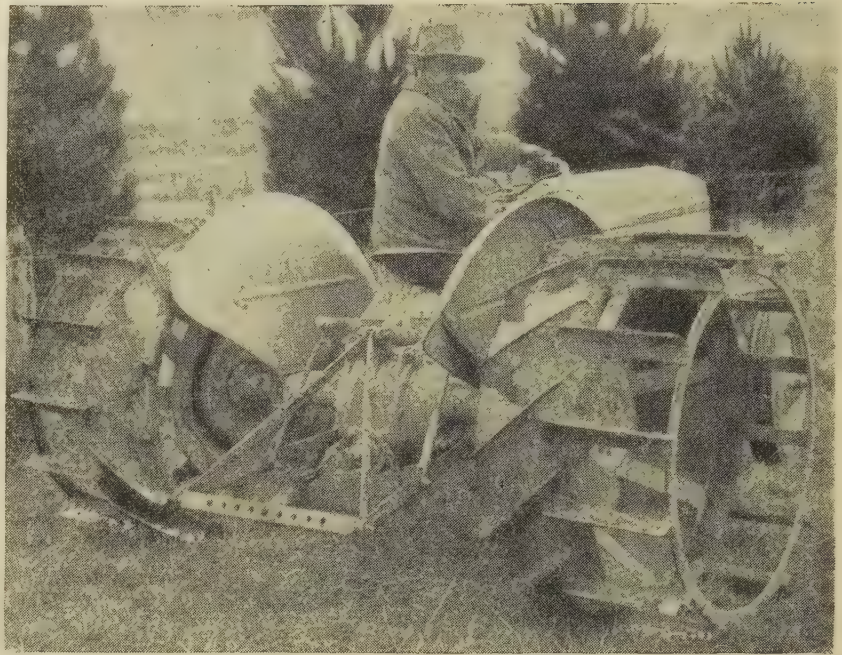
SWAMPY ground is treacherous work for the tractor and nerve-racking for the driver, as the surface is easily broken and this may result in the tractor bogging down. Stumps, hollows, and hillocks make tractor driving hazardous. The steel wheel equipment shown in the illustration has proved almost impossible to bog down and is very stable on rough ground. Moreover, the large area in contact with the ground causes less compaction.

MR. B. C. COLBRAN, who has a property at Timpanys, Southland, has found the equipment illustrated ideal when he works his peat swamp-land, where uneven ground, stumps, and holes are prevalent. When road work is to be done, however, it takes only a few minutes to replace the original rubber-tyred wheels.

Farmers developing swampy ground would be wise to consider fitting this type of wheel equipment. It is probable, too, that farmers on easy hill country could make use of a tractor so equipped when finance to buy a tracklaying tractor is lacking.

Mr. Colbran's swamp equipment consists of, first, an old pair of steel tractor wheels, approximately the diameter of the tractor's original rubber tyres. The steel wheels required some alteration so that they could be attached to the tractor. The spokes of each steel wheel were cut to fit and welded to a ring which was bolted to the tractor hub plate. This ring is made from $\frac{1}{2}$ in. thick mild steel and is 3in. wide with holes drilled to match the bolts on the tractor hub.

The second part of the equipment is the extension, a ring of horizontal steel bars. Cage wheels, as they are called, are very popular overseas, being fitted to tractors and other implements for swampy, wet conditions. The set shown came with the old steel wheels, but were still in good order.



The bars of 3in. x 2in. x $\frac{1}{4}$ in. angle iron are 15in. long, placed with the 3in. edge out to bite into the ground. The outer ends are supported by a ring on edge, $\frac{1}{2}$ in. thick and 2 $\frac{1}{2}$ in. deep. An inside hoop 2in. wide and of $\frac{1}{2}$ in. metal has a break at one point; there an adjuster bolt allows the extension wheels to be expanded slightly and removed if desired, for the horizontal bars overlap the steel wheels by some 4in.

Three $\frac{1}{2}$ in. hook bolts arranged around the extension wheel hook on to the outer rim of the steel wheel and bolt down 3 of the horizontal bars. The extension is thus effectively clamped to the steel wheel. It is suggested, however, that if this equipment were

to be constructed, the inner hoop could be omitted. The extensions would then be a permanent fixture with the horizontal bars welded to the steel wheels. It would be necessary if this were done to have alternative wheels with rubber tyres for other work.

The horizontal bars on Mr. Colbran's extension wheels are fitted 9in. apart, but they may require different spacing on other types of steel wheels which may be fitted with cage wheel extensions to prevent interference with the tread bars.

—**L. H. WESTON**,
*Machinery Instructor,
Department of Agriculture,
Dunedin*

Farm Building Construction

(Continued from page 71)

necessary a concrete floor should be laid on hard rock fill in preference to soil. The air spaces contained in the hard fill provide insulation and if the floor is a concrete one, it can also be waterproofed.

Floor coverings suited to particular conditions include cork materials, linoleum, bituminous materials, terrazzo, rubber materials, wood block or parquet, plastic materials, carpets, and ceramic tiles.

With the exception of terrazzo and parquet these materials are available for laying in either small units such as tiles or mats or as a roll covering for laying in strips. Some are particularly suited to hard wear and subjec-

tion to moisture and others have better sound and heat insulating properties. For example, rubber or cork composition floorings are best suited to kitchen use, terrazzo to bathrooms or shower closets, wood block and parquet to halls, and carpet to living rooms.

Some floor coverings are suitable for concrete floors only, others for wood floors, and some for both. All are available in a range of colours or combination of colours to suit any colour scheme. Where resilience and sound insulation are required some floor coverings need an underlay of some material that has these properties to a greater degree than the covering itself; for example, linoleum laid on a concrete floor may deaden sound to some extent, but is just as hard on the feet as concrete itself unless it is pro-

vided with an underlay of some resilient material. Carpets if laid on a wooden floor without underfelt give no softness to the tread and quickly wear out, whereas the inclusion of underfelt provides softness as well as much improved heat insulation.

Choice of Flooring

The same principle of relation of first costs to life and maintenance applies to choice of floor coverings as to roofing material. It may be unwise to choose either the basic floor or the floor covering that can be provided for least cost, as shortened economic life and increased maintenance may be more expensive over a period and may outweigh any saving in first cost.

Drainage by Pumping

By D. F. SCOTT,
Machinery Instructor, Department of
Agriculture, Auckland

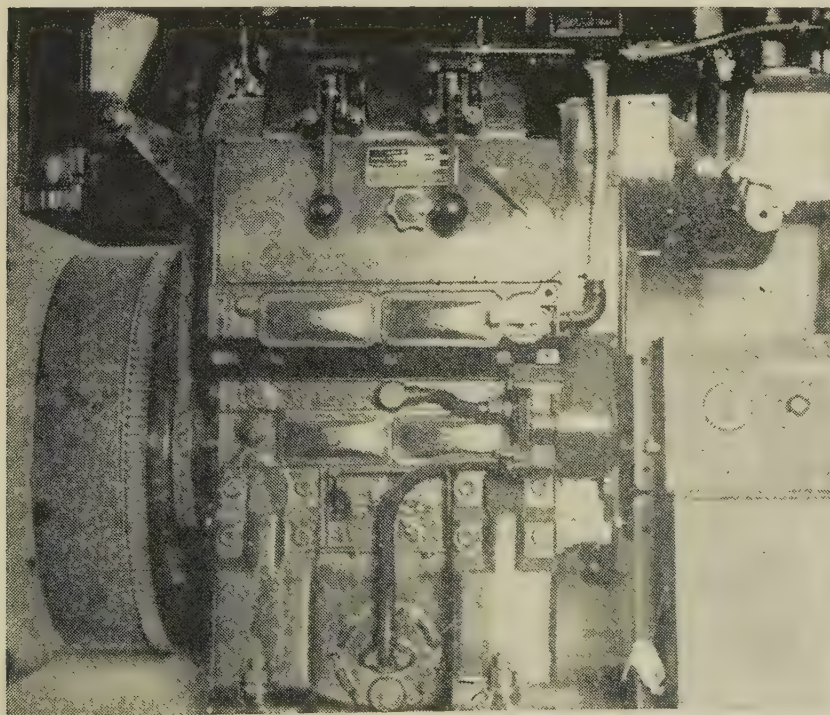
MOST land drainage systems in New Zealand depend on gravity flow for their outlet, but sometimes any of the following can make it necessary to use pumping: Drainage into a tidal estuary; drainage into a stream or river subject to flooding; situations where outlet is through a drain or drains not well maintained; drainage of low-lying, flat areas where the required depth of outlet drain is lower than that available.

IN most schemes where pumping is used it is possible to get gravity drainage for a limited period. In tidal areas gravity drainage is available between tides, and in flood areas between floods, so that it is usual to provide a gravity outlet in the form of a flood-gate, which is set as low as conditions permit.

Sometimes during the initial stages of developing land, such as reclaimed tidal flats or low-lying swamp, when open drains alone are used for infield



A cast-iron flood-gate fitted to a flood pump installation. When the photograph was taken the flood-gate was held open by a piece of wire.



A 2-cylinder diesel engine with automatic control which allows the engine to be started and stopped automatically by a float switch. The engine is fitted with safety switches which stop it if lubricating oil pressure is lost or the radiator temperature rises unduly.

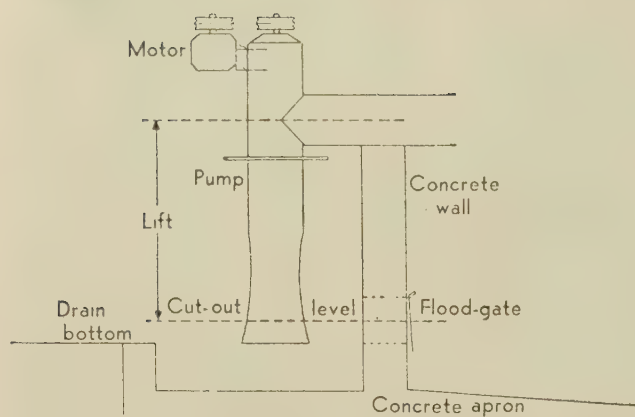
drainage, it is satisfactory to use what gravity drainage can be obtained by the use of flood-gates. This is because open drains can tolerate high water levels without any ill effects. However, if it is desired to install tile drains or combined tile-mole systems, high water level in outlet drains cannot be allowed and often at this stage pumping must be resorted to.

Types of Pumps

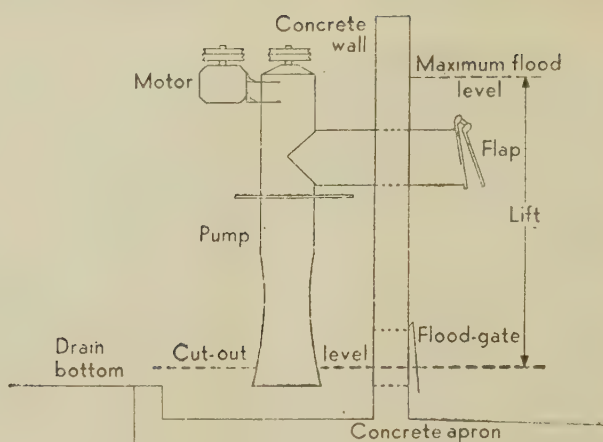
Pumps used for land drainage in this country are usually axial-flow pumps and consist briefly of a vertical tube containing an impeller which looks something like a ship's propeller. Pumps of this type are manufactured in New Zealand by well-known firms; a simple type of farm-built flood pump with a limited lift is made by a Waikato farmer-engineer, and ordinary centrifugal pumps are also used to a limited extent.

Some of the smaller installations use centrifugal, sump-type pumps with capacities of up to 12,000 gallons per hour, and one of the biggest flood pumping installations in the country, at Kerepehi on the Hauraki Plains, uses a 33in. centrifugal pump. Most farm installations, however, will use the axial-flow type of pump mentioned above. These axial-flow pumps have high efficiencies when used for the purposes for which they were designed.

TYPES OF PUMPS FOR DRAINAGE



The most common type of pump arrangement, with a flood-gate to cope with gravity drainage and a pump which has free discharge. The lift is measured from the lowest water level on the intake side to the centre of the discharge pipe.



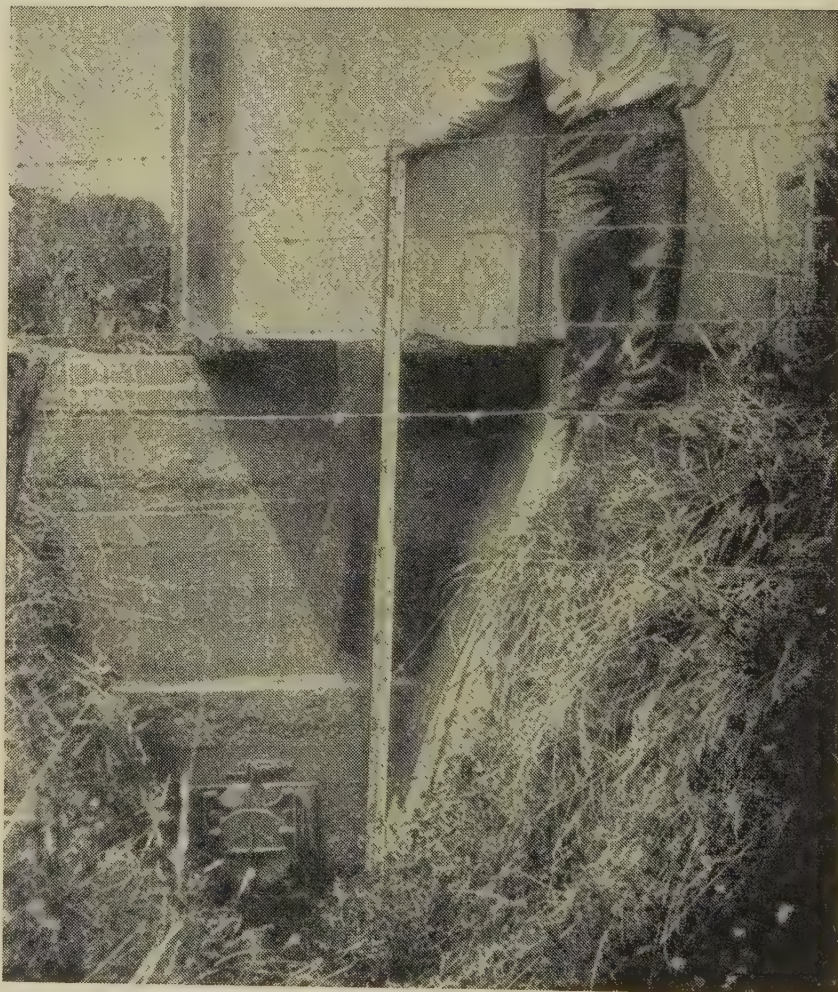
A pump installation in which the outlet may sometimes be submerged. The discharge pipe is fitted with a flap. The lift is measured from the lowest water level on the intake side to the maximum flood level on the discharge side.

Vertical axial-flow pumps used in this country are of two types. One is fitted with a direct-drive motor so that the impeller of the pump travels at motor speed. To deal with variations in lifts and quantities of water pumped the makers supply different impellers. The other type is driven by V belts. This means that the same impeller can be used over a range of operating conditions by changing pulley ratios to give different impeller speeds.

Both types of pump have advantages. The direct-drive machine has no V belts, so that transmission losses are eliminated, but some users prefer the indirect drive because it allows easy variation of pump speed and means that an ordinary electric motor fitted with a thrust bearing for vertical drive can be used. The direct-drive pump requires a special flange mounting motor.

Many farmers using flood pumps have had trouble with eels. The usual difficulty was that an eel would get into the pump and might be partly cut up by the impeller, but often quite a large piece of eel would become draped over the leading edge of the impeller and in that position would put the impeller out of balance and cause vibration and overloading of the motor. Often eels collected in this way would gradually work inward toward the centre of the impeller and become wound round the impeller shaft, causing further overloading. One make of pump has eliminated this trouble by sharpening the impeller and so shaping its leading edge that eels or small pieces of root are flung to the outside and there cut between the sharpened impeller and the pump casing.

Both with flood-gates and flood pumps it is desirable to have some



The concrete wall, about 7ft. 6in. high, the flood-gate set in the bottom of it, and part of the pump house.

means of straining floating debris before the flow enters the pump bay. Roots and other pieces of timber can jam the flood-gate or damage or overload the pump. It is preferable to fit some form of screen that can be easily cleaned, as in some installations the amount of debris coming down is considerable, particularly during flood time.

Screens can be made from either metal or wood. They are often sloped so that the farmer can clean them easily with a drag. Some pump users have found that metal screens supported on a wooden beam and electrified with a charge of about 12 volts are very effective in preventing eels approaching the pumps. For safety reasons installations of this type must be made by a registered electrician and passed by the local supply authority before they are used.

Generally the efficiency of axial-flow pumps falls off when they are used on heads greater than 10ft., and for lifts greater than this either an ordinary centrifugal pump or a combina-

tion of the two known as a mixed-flow pump is used. The mixed-flow pump is rather similar to the axial-flow pump, but its impeller gives a centrifugal action as well as a screw action, with the result that it can be used at a somewhat higher head than the plain screw or axial-flow pump. Mixed-flow pumps can be used on heads of up to 24ft. with reasonable efficiency.

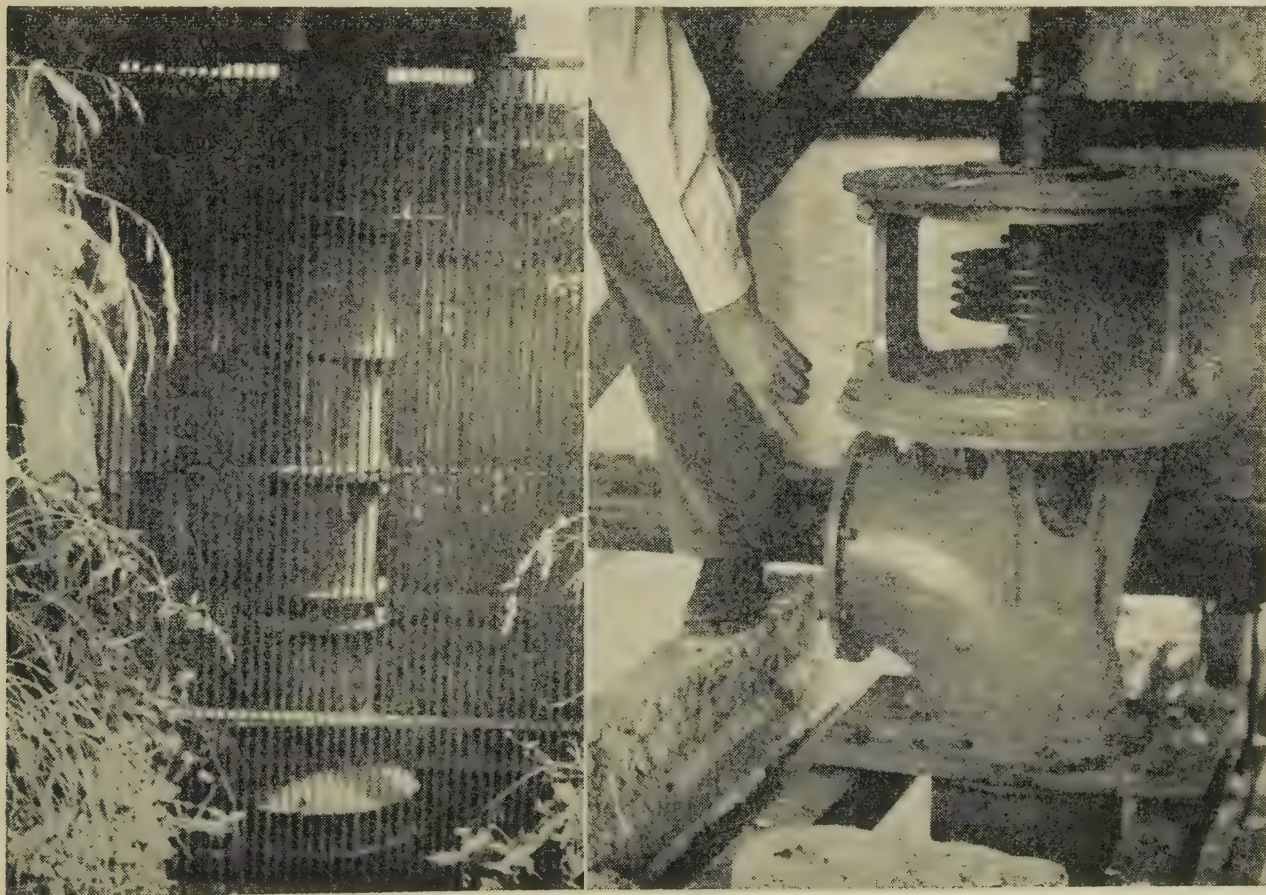
Centrifugal pumps are generally used only on very large schemes. Horizontal-shaft centrifugal pumps have the disadvantage that they require priming equipment to fill the pump with water before it is started. Another possible fault of this type is that the engine or electric motor is usually mounted at the same level as the pump and could easily be submerged in a major flood or a collapse of a flood-bank. With vertical drive pumps the motor can be mounted well above the pump to obviate this risk.

The most satisfactory method of driving flood pumps is by electric motor. These motors are very simple

... DRAINAGE BY PUMPING

to control automatically by a float switch, and automatic control is almost always a necessity in these installations. Electric motors require practically no maintenance and can be easily coupled to pumps using either a direct drive or a system of belts.

Unfortunately the site of a flood pump is usually dictated by factors beyond the control of the designer of the drainage system, and often a new installation may require a long extension to electric power lines if the plant is to be driven by electric motor. For this reason quite a number of flood pumps are driven by internal-combustion engines, usually diesel, and recently a well-known make of diesel engine has been satisfactorily fitted with an automatic starting and stopping device which enables it to be operated from a float switch. Even though automatic control can be achieved, diesel engines still require much more attention than electric motors. Such things as cleaning of



Left—The intake side of the pump from the bottom of the drain. The outline of the pump can be seen through the screen. The enlargement at the base of the pump is the intake screen. Right—The upper end of the pump shown at left. It has been fitted for belt drive from a diesel engine. Normally, an electric motor would be mounted on the top mounting plate. The hand is pointing to the discharge opening of the pump, which has yet to be extended so that the water will pour over the wall.

PROVED NEW ZEALAND'S BEST INFLATION!



Regd. N.Z. Design No. 6464
Regd. Aust. Design No. 29832



TITCHON TAPERED WAIST INFLATIONS give perfect milking. Increased sales prove that more and more farmers are using Titchon. The tapered waist stops bagginess . . . counteracts stretch . . . gives even, more constant tension . . . positive pulsation. For longer lasting 100% efficient service, fit Titchon, the proved inflation—now!



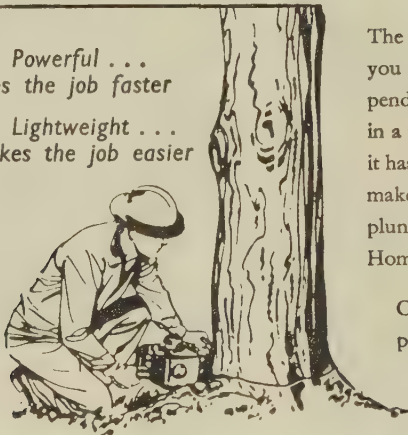
The Homelite

Model 17

ONE MAN Chain Saw

It's Powerful . . .
does the job faster

It's Lightweight . . .
makes the job easier



The model 17 gives you consistent, dependable, performance in a wide range of cutting jobs. With $3\frac{1}{2}$ horsepower and gear drive, it has enough power to handle production cutting. Its 20 lb. weight makes it light enough for use by farmers and estate owners. With plunge cut bows, brush cutting and clearing attachments, the Homelite Model 17 is a versatile year-round saw.

Other models available:— Model EZ—5 horsepower, light yet powerful saw; Model 7-29—7 horsepower one man saw.

Enquire at your local Homelite Dealer or write

CABLE-PRICE CORPORATION LTD.

fuel and oil filters and checking and changing of oil must get regular attention during the operating season and fuel has to be carried to the pump site.

Electric motors, however, are not trouble free by any means, especially when large motors are used under automatic control in fairly remote rural areas. Unfortunately voltage regulation on rural power systems is not good and motors must often run on low voltage. Though protective devices are fitted, burnt-out motors are not uncommon and often the first indication the farmer has that anything is wrong is the water level rising in the drainage system.

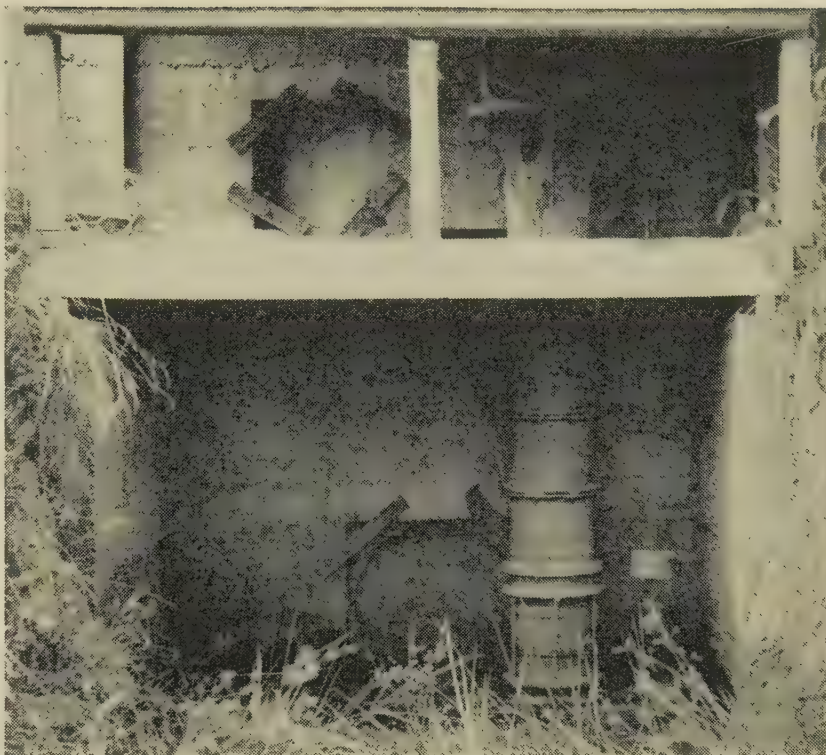
Where a pump house can be seen from the homestead it is a good idea to fit outside pilot lights which are connected in parallel with the motor. This means that when the motor is running the lights will be on, and if the lights go out when the pump should be running, the farmer can investigate.

Farmers should consult the suppliers of their motor or their power supply authority for advice on the purchase of adequate protective gear that will save their motors in the event of single phasing, low voltage, or overloading caused by debris jamming the pump.

Size of Installation

The size of the pumping installation will depend mainly on the area being drained. It is good practice to keep

DRAINAGE BY PUMPING



The intake side of a flood pump. The large gravity flood-gate is in the bottom of the pump bay, and suspended beside the pump is the float for the float switch. This pump has a capacity of 70,000 gallons per hour against a total head of about 8ft.



The outlet side of a pump installation, showing the gravity flood-gate as well as the flap on the pump outlet. The steel plate beside the pump outlet is fitted as a temporary block to a hole in the wall over which a second pump can be mounted.

to a minimum the area that must be handled by the pump. Where possible, drainage water from higher country should be diverted to by-pass the pump system. Every gallon of water the pump handles will cost money, so it is in the farmer's interest, because of both initial cost and running cost, to keep the size of his installation as small as possible.

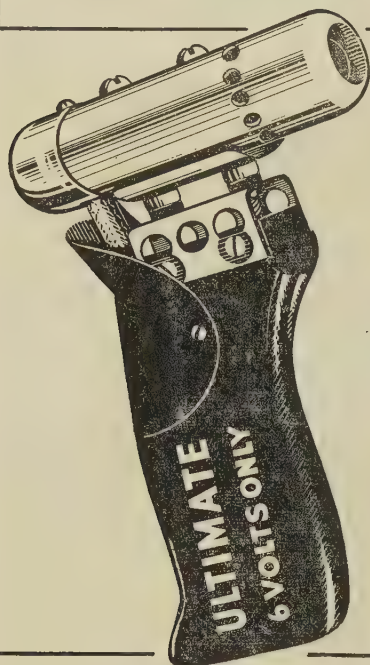
In choosing a pump one must consider the area, the heaviest likely rate of rainfall, and the percentage of run-off. This run-off coefficient, as it is called, will vary greatly according to soil type, the topography, and the vegetation covering the area.

To design a pumping system where the calculations are based on run-off a considerable amount of investigation work would be necessary over several years before the installation was made. For this reason it is usual to use as an approximate guide, at least in Auckland Province, the figure of 1in. per 24 hours. This means that to drain 10 acres the pump will have a capacity of 10,000 gallons per hour and to drain 100 acres 100,000 gallons per hour. This figure is probably on the generous side and the writer is aware of many pumps which handle greater areas than this. English pub-

ELECTRIC

Ultimate

CALF DISBUDDER



THE QUICKEST,
THE SUREST,
THE SAFEST,
AND MOST HUMANE

Your calves deserve the best treatment! You can get 100% success quickly and painlessly with one application of the Ultimate Calf Disbudder.

Stringently tested, this thermocautery disbudder meets with the full approval of veterinary surgeons. The Ultimate Calf Disbudder works off any six volt battery. Made of high grade rustless parts that will last indefinitely, the Ultimate Calf Disbudder can be used in the open in any kind of weather.

All leading stock and station agents have supplies or contact the distributors:—

Gane

MILKING MACHINE CO. LTD.

Head Office: Anzac Avenue, Auckland. Branches at Hamilton, Whangarei, Palmerston North and Paeroa. Agents throughout New Zealand.

You'll Love to Travel

BY RAILCAR



You can really RELAX in the adjustable, foam-rubber, reclining seats on the smart new railcars now serving some 2,000 miles of New Zealand's main lines. Forty fast services daily.

Railcars and express trains offer delightful opportunities for peaceful, carefree travel . . . at LOW COST.

Book YOUR seats by train or railcar !



For Travel Pleasure

NEW ZEALAND RAILWAYS

It Costs Less to Bale with **CASE**®

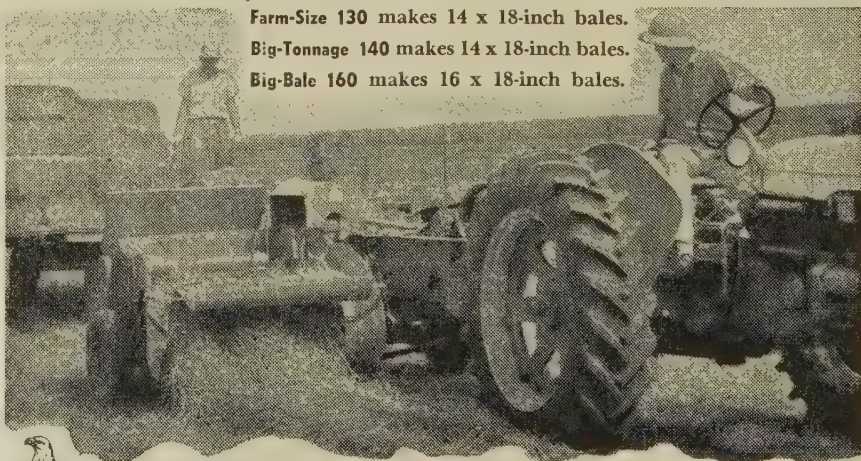
Case Balers get their tremendous capacity and strength from proved design rather than from costly size and weight. Too, they are famed for their positive tying and big capacity. That is why Case balers often out-perform heavier machines. You get a steady stream of firm, neat, sliced bales, tied *automatically* with twine or

wire. Case sliced bales are easy to feed without shattering and losing precious protein-rich leaves. Shippers prefer Case bales with their firm neatness and strong ties for stacking and shipping. Choose the Case baler model that fits your needs, with thrifty engine or economical power take-off drive.

Farm-Size 130 makes 14 x 18-inch bales.

Big-Tonnage 140 makes 14 x 18-inch bales.

Big-Bale 160 makes 16 x 18-inch bales.



Ask Your CASE Distributor:

G.8875

NATIONAL MORTGAGE AND AGENCY CO. LTD., Dunedin, Oamaru, Timaru, Waimate, Ashburton, Christchurch and Hokitika.

J. G. WARD & CO. LTD., Invercargill and Gore.

C. W. PARKER & CO., Blenheim.

SHUTTLEWORTH BROS. LTD., Wakefield, Nelson.

North Island: FARM SPECIALITIES LTD., 100 Park Road, Auckland.



lications mention the figure of $\frac{1}{4}$ in. per 24 hours with a maximum of $\frac{3}{4}$ in. At this rate of run-off a 10-acre block would require a pump capacity of between 2500 and 4000 gallons per hour. Where the pump is providing an outlet for mole or tile drains the figure of $\frac{1}{4}$ in. per 24 hours should be adhered to.

It is usual to mount the pumps in a concrete pumping bay. This same concrete work is used to mount the flood-gates when they are used. Because of the large volumes of water handled by the pumps precautions must be taken to prevent scouring, particularly on the outlet side of the pumps, where the water may often fall several feet on to the bottom of the outlet drain. The drain and the land beside it should be protected either by a concrete apron or by metal or wooden fluming. On the intake side of the pump it is also usual to provide a concrete floor for the same reason. The pump should be set up so that its intake is submerged by at least 1 ft. of water at its lowest pumping level. If this is not done, the pump may suck air.

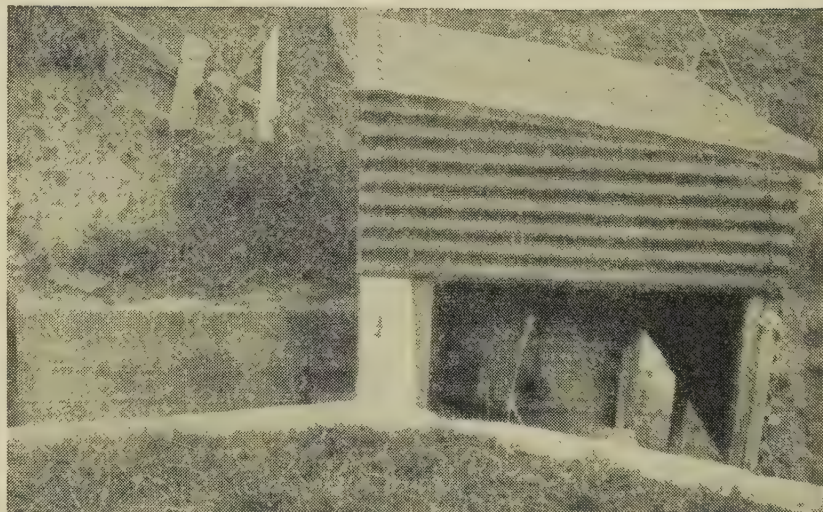
In large installations it is good practice to have two small pumps rather than one big one. In this way a breakdown of one pump or motor does not put the plant completely out of action and also in most systems there will be considerable variation in the level of water on the intake side during pumping. For most efficient operation one pump would deal with the maximum lift required and the second pump would be chosen to work at greatest efficiency for a lower lift. As both pumps would be controlled by float switches, each would operate only at the appropriate times.

To ensure that the pumps run for a reasonable time instead of starting and stopping frequently, adequate capacity should be provided in the pumping bay or the drain close to the pumps. The range of movement of the float switch can be adjusted to set the starting and stopping levels of water at the pumps. If the pump runs for short periods only, the distance between the on and off stops on the switch can be increased.

Power Requirements

The power necessary to drive any pump can be calculated from the quantity of water handled per minute and the height of lift involved. The lift is measured from the level of the impeller to the centre of the pump discharge pipe (see the top-left sketch on page 74). If the discharge is submerged, the lift is measured from the level of the impeller to the surface on the discharge side. This will of course

POWER REQUIREMENTS OF PUMPS



Above and below—A drainage pump house, showing a well-constructed concrete wall and abutments which fit into the flood-bank and reduce the chances of seepage.



be the maximum head. The actual head will vary in operation according to the height of water in the drains and possibly the flood level outside the bank.

The water horsepower can be calculated as follows:—

$$\text{H.p.} = \frac{\text{gallons/minute} \times \text{head in feet}}{3300}$$

Usually the pump will be only about 50 per cent. efficient, so the motor horsepower will be at least twice the water horsepower, and in addition a further safety factor of about 50 per cent. is often used to allow for low voltage and other overloading that may occur. When the pump is likely

to work under submerged-outlet conditions it will be necessary to fit a flap gate to the pump's outlet.

Under some conditions, particularly in peaty soils, there may be considerable subsidence after drainage. This will mean that in time the lifts of the pumps will have to be increased. In practice what usually happens is that initially one pump suitable for the present conditions is installed and after subsidence has taken place a second pump with a greater lift is added. Where subsidence is considerable the cost of pumping will increase as the subsidence takes place, and at the same time the assistance of gravity drainage will be less, so

EFFICIENCY OF DRAINAGE PUMPS



A drainage ditch built around the side of a hill on a grade of 1 in 500 to intercept hill run-off before it reaches the flat. This drain discharges over the end of the stop-bank and so reduces the amount of water to be pumped.

more of the water falling on the catchment must be pumped. For this reason it is important to have some idea of the likely extent of subsidence before installing pumps.

With many flood pumps driven by electric motors no special arrangements are made for cheap power. This is because power boards usually require time switching or ripple control switching, which will permit them to stop the pumps during peak load periods. Under these conditions cheap power is usually available. With small installations that do not run for long periods during the year it is probably preferable to pay for power at a higher rate to have 24-hour pumping. Where large installations are planned and particularly where pumps must run for long periods, it may be preferable to provide sufficient storage capacity in the main drains and pumping bays to permit pumps to be switched off during peak load periods. Under these conditions the power board will probably supply power cheaper. In big installations the possibility of two-rate metering allowing cheap pumping at night should also be discussed with the power board.

Pump Efficiency

A factor that has considerable effect on both the initial cost of pumping equipment and also its running cost is the efficiency of the pump itself. Well-designed pumps used on jobs for

which they were designed will run much more cheaply than inferior units. This is because the pump will take less horsepower to drive it and yet will do the same job as an inferior machine with a much larger motor. Though the efficient pump may cost more initially, it should be remembered that the inferior machine will require a larger motor which will cost more and will use more power over its entire life. A further point that should be remembered is that many power boards impose on electric motors a standing charge of so much per horsepower per month so that the inferior pump with the larger horsepower motor will be further penalised by higher running costs. For running economy it is important to use a pump designed for the particular job. If water is to be lifted only 4ft., a pump with a 6ft. lift should not be bought. Such a pump will do unnecessary work and will cost more initially and more to run.

Stop-banks

Nearly all flood pumping installations will require stop-banks, as usually the land to be drained is endangered by either flood water or high tides. Adequate banks are important; otherwise pumps may be handling water that is either leaking through or running over unsatisfactory flood-banks. Flood-banks should be built at least 1ft. to 18in. above the maximum flood or tide level.

In tidal areas it is usually not economical for farmers to build and maintain banks that are subject to wave action, so banks should be placed so that they are protected, and if there is a likelihood of occasional waves, considerably more freeboard should be allowed. It should be remembered that one flooding with salt water can do considerable damage to pastures and crops and may waste years of work.

If stop-banks are built from material dug from a drain running round the inside of the bank, a reasonably wide berm should be left between the bank and the drain. This will allow the passage of machinery for cleaning the drain and topping up the flood-bank, but what is more important is that it will reduce the possibility of seepage from the outside of the bank to the drain during high tides or floods. If porous material such as pumice or sand is used in the bank, no drains should be dug anywhere near the inside of the bank.

The width of the bank both at its base and at the top will depend on the height, but as a general rule it is good practice to have a bank with a top width equal to its height and a batter of $1\frac{1}{2}$ to 1. No vegetable material or timber should be incorporated in the bank as it is being built and the site of the bank should be cleaned of all surface soil and vegetation before building begins.

Small banks can be conveniently built with a bulldozer or an angle-dozzer; large ones are better done with a carry-all, or where a drain is being dug round the inside of the bank a dragline excavator can conveniently dig the drain and swing round to deposit the spoil on the bank as it goes.

Banks should always be protected from stock by complete fencing and should be grassed as soon as possible after completion. The species of grass used will depend on the locality, but grasses such as kikuyu and buffalo grass are excellent because of the binding nature of their roots. Buffalo grass is useful near the sea because of its resistance to salt wind, and where farmers are reluctant to use kikuyu owing to the risk of its spreading, pasture grasses can be used. In trials Italian ryegrass has shown its value in establishing a quick cover, which is one of the main requirements, especially where the bank is likely to suffer from erosion from wind or water.

Banks will require topping up from time to time, so this should be borne in mind when nearby fences are being planned, and room should be left for the necessary machinery. There will be considerable subsidence in all new banks owing to consolidation of the material. Depending on what the

bank is made of, subsidences from 30 to 50 per cent. can be expected on a new bank. Banks should be built high enough to allow for this. Banks consolidated by machine have from 8 to 10 per cent. less volume than banks with soil deposited without compaction.

Flood-gates

As mentioned earlier, flood-gates will very likely be used to give gravity drainage when possible. On tidal works it is usual to site the flood-gate about level with low-water spring tides, but this may not be possible if the outlet channel between the flood-gate and deep water is likely to silt up. The flood-gates should be placed as near as possible to a deep channel. Often a tidal creek will provide this, and only a very short length of channel will be required between the flood-gate and the deep water. Flood-gates will also require protection against erosion, particularly on their outlet sides.

Gates can be made of a variety of materials, either concrete or cast iron being the more durable. However, wooden gates if properly made are quite satisfactory and are less liable

to damage due to slamming caused by wave action or the wake from boats.

Quite frequently flood-gates collapse owing to unsatisfactory foundations. Where possible firm land should be chosen as the site for the gate, but where this is not possible piles may

be necessary or else the structure of the flood-gate supports and pipes leading through the bank should be braced sufficiently and reinforced to prevent collapse.

A rough guide to the size of flood-gates to be used is to allow 1 sq. ft. of flood-gate area for every 30 acres of flat land, and for flat land with some hill water 1 sq. ft. per 20 acres is suggested. Obviously these figures can be taken only as a rough guide, as such factors as the time the flood-gate is open and the rate of run-off from the catchment are most important.

As flood pumps are often placed in positions that may be submerged in major floods and as flood-banks may be damaged, it is usual to provide a means of hauling the electric motor above likely flood level in an emergency. In some installations the motor is permanently mounted quite a distance above the normal position and a specially long shaft used to couple to the pump.

Though the initial outlay on drainage pumping schemes is usually fairly high, a properly designed system using efficient pumps is well worth while and the outlay appears quite reasonable when considered on a per acre basis. Naturally, pumping will be used only when gravity drainage is not possible, but there are considerable areas in Auckland Province that are already partly drained and could be still further improved by the use of pumps.

References

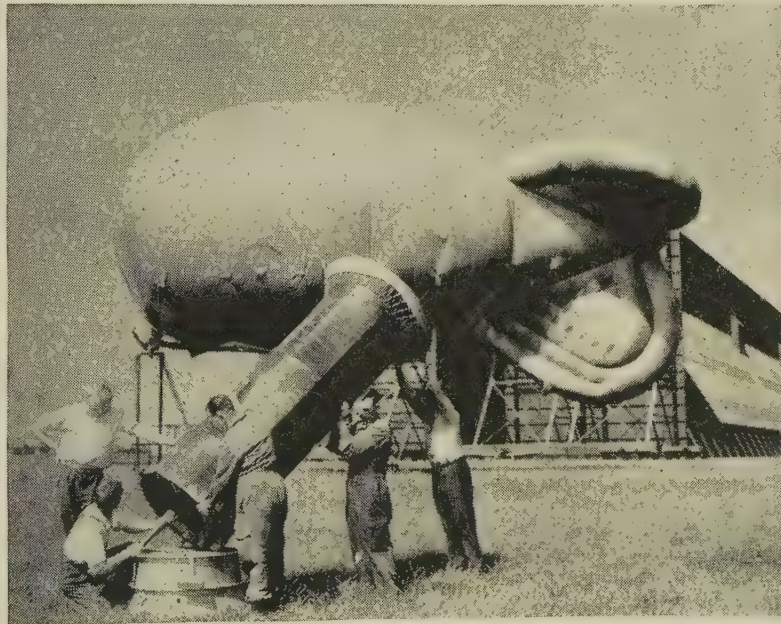
- J. G. Sutton, United States Department of Agriculture Technical Bulletin 1008, "Design and Operation of Drainage Pumping Plants", 1950.
- E. A. G. Johnson, "Land Drainage in England and Wales".
- R. C. Lough, Proceedings of New Zealand Institute of Engineers, "Notes on Preparation of Drainage and Flood Control Schemes", 1946.

DRAINAGE BY PUMPING



A special arrangement in which a flood pump pumps water through a culvert under a road. The large concrete box acts as a surge chamber at the junction of the pump outlet pipe and the culvert pipe. The pump outlet is fitted with a flap valve.

Balloon to Trap Insects

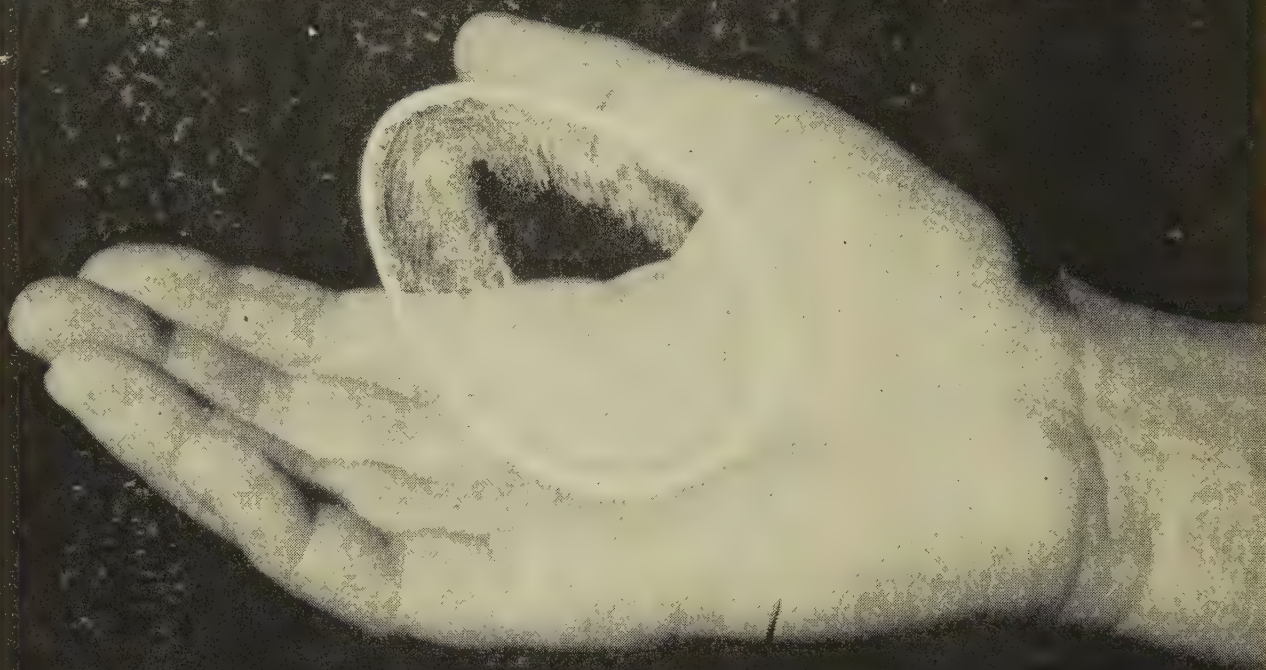


THE balloon shown above is used to trap insects in the upper atmosphere. Scientists at the Rothamsted Experimental Station, Hertfordshire, England, are thus able to study how weather affects the population of insect pests on crops. Agricultural problems are being scientifically studied in many countries and the interchange of the resultant knowledge and its application in practical farming through intensive extension services are making possible great advances in production.

BISCUITS . . .

CAKES . . .

PUDDINGS



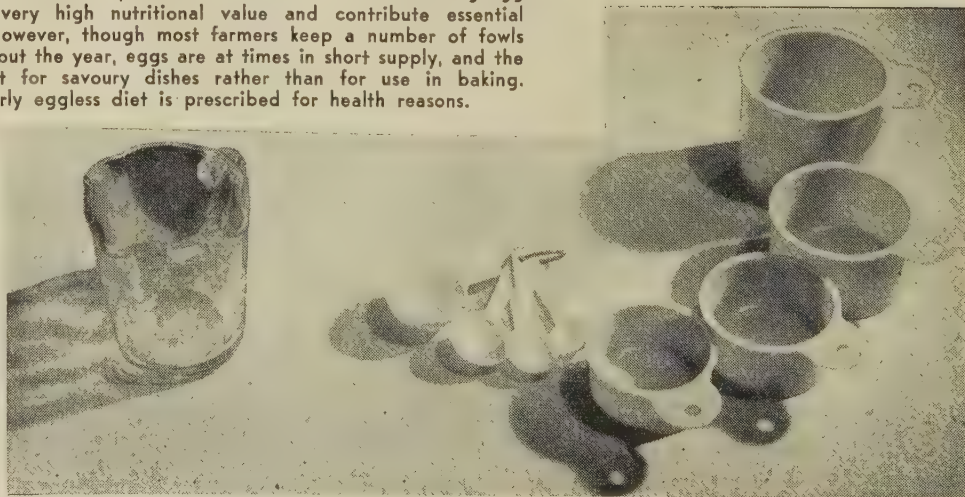
When there are No Eggs on Hand

By CHRISTINE LYONS,

Field Officer in Rural Sociology, Department of Agriculture, Auckland

THE recipes in this article have not been compiled with the intention of decreasing egg consumption. Eggs have a very high nutritional value and contribute essential requirements in a normal diet. However, though most farmers keep a number of fowls to ensure a supply of eggs throughout the year, eggs are at times in short supply, and the few fresh ones available are kept for savoury dishes rather than for use in baking. Sometimes, too, an eggless or nearly eggless diet is prescribed for health reasons.

IT is hoped that the recipes given will be a useful stand-by when biscuits, cakes, or puddings are needed unexpectedly and there are no eggs on hand. All measurements in the recipes given are level and are for standard measuring cups and standard measuring spoons (see examples at right).



Biscuits

biscuit cutter. Cook in slow oven (300 degrees F.) for 20 minutes.

. . . RECIPES

American Crunch

4oz. of butter
2oz. of desiccated coconut
1 dessertspoon of cocoa
3oz. of brown sugar
4oz. of flour
½ teaspoon of baking powder

(Yields about 40 pieces)

Melt the butter in a saucepan, sieve the flour, baking powder, and cocoa, and add with the remaining ingredients to the butter. Press flat, about ¼ in. thick, on to a cold oven tray. Cook in moderate oven (350 degrees F.) for 20 minutes or until crisp. Ice and cut into squares while hot.

Icing

4oz. of icing sugar
1oz. of butter
Water to mix (about 2 teaspoons)
2oz. of desiccated coconut
1 tablespoon of cocoa

Cream sieved icing sugar, cocoa, and butter. Add coconut and water to mix.

Betty Boop

4oz. of butter
4oz. of brown sugar
4oz. of flour
1 teaspoon of baking powder
1 tablespoon of golden syrup
½ tablespoon of cocoa
½ oz. of breakfast flakes
2 tablespoons of desiccated coconut
½ teaspoon of salt

(Yields about 30 squares)

Melt the butter and golden syrup in a saucepan. Sieve the flour, baking powder, cocoa, and salt and add with the remaining ingredients to the butter and golden syrup mixture. Press flat, about ¼ in. thickness, on to a cold, ungreased baking dish 7 in. x 9 in. Bake in cool oven (300 degrees F.) for 20 to 30 minutes. Ice with chocolate icing and cut into squares while hot.

Icing

1 tablespoon of butter
4oz. of icing sugar
2 tablespoons of milk
3 teaspoons of cocoa
½ teaspoon of vanilla essence

Cream the sieved icing sugar, cocoa, and butter. Add the vanilla essence and sufficient water to mix.

Chocolate Marshmallows



Marshmallow

1 teaspoon of gelatine
2oz. of sugar
2oz. of cold water
5oz. of icing sugar

Soak the gelatine in the cold water for 5 minutes. Put into the saucepan with the 2oz. of sugar and bring to the boil, stirring all the time. Leave to boil for 4 minutes without stirring. Cool, add the icing sugar, and whisk until the volume doubles and the mixture is firm. Put a spoonful on top of each biscuit and leave to set. Then coat the marshmallow with chocolate icing and put a walnut half on top.

Coconut Crisps

4oz. of butter
5oz. of flour
½ teaspoon of baking powder
½ teaspoon of vanilla essence
3½oz. of sugar
2oz. of desiccated coconut
½ teaspoon of salt

(Yields about 36)

Cream the butter and sugar and add the vanilla essence. Sift the flour, baking powder, and salt and add to the creamed mixture together with the coconut. Roll into small balls and put on a lightly greased baking tray. Flatten with a fork and bake in a moderate oven (350 degrees F.) for 10 minutes.

Honey Crisps



2oz. of butter
2oz. of sugar
1 tablespoon of honey
3oz. of rice bubbles

(Yields about 24)

Boil the butter, honey, and sugar for 5 minutes. Remove from the heat and add the rice bubbles. Put in spoonfuls on grease-proof paper and leave to set. Alternatively, this mixture can be pressed into a flat baking dish to ¼ in. thickness and cut into fingers when set.

Custard Kisses

6oz. of butter
½ teaspoon of salt
2oz. of custard powder
2oz. of icing sugar
6oz. of flour

(Yields about 24)

Cream the butter and icing sugar. Work in the sifted dry ingredients. Form into small balls and place on a cold oven tray. Press lightly with the back of a fork. Cook in a moderate

oven (350 degrees F.) until golden brown (about 10 minutes). When cool sandwich together with vanilla butter icing.

Date Nutties

4oz. of butter
1 dessertspoon of golden syrup
8oz. of flour
8oz. of chopped dates
4oz. of brown sugar
1 tablespoon of milk (approximately)
½ teaspoon of vinegar
1 teaspoon of baking powder
2oz. of walnuts

(Yields 40 to 48)

Cream the butter and sugar and add the golden syrup and vinegar. Then add sifted flour and baking powder, dates and chopped nuts, and sufficient milk to bind. Put in small spoonfuls on a cold, greased tray. Bake in a hot oven (400 degrees F.) for 15 minutes.

Date Fingers

Filling

4oz. of brown sugar
½ lb. of stoned cooking dates
4oz. of boiling water
1 tablespoon of lemon juice (optional)
½ teaspoon of vanilla essence

Put all but the vanilla in a saucepan. Simmer for 10 minutes. Add the vanilla after removing the mixture from the heat and put aside to cool.

Biscuit Mixture

4oz. of wholemeal flour
2oz. of flour
½ teaspoon of salt
4oz. of butter
½ teaspoon of vanilla
6oz. of brown sugar
½ teaspoon of bicarbonate of soda
4oz. of rolled oats

(Yields about 36 fingers)

Sieve the flour, wholemeal flour, bicarbonate of soda, and salt into a basin. Add the sugar. Melt the butter and pour it and the vanilla over the other ingredients and then add the rolled oats. Blend well together and put half the mixture in a shallow tin and press down well. Spread the cooled filling over this and then put the other half of the mixture on top. Bake for 30 minutes in a moderate oven (350 degrees F.) and cut into fingers when cool.

Jammy Rings



Biscuit Mix

3oz. of butter
3oz. of flour
1oz. of cornflour
1oz. of icing sugar
½ teaspoon of baking powder

(Yields about 30 biscuits)

Cream the butter and icing sugar, add sifted dry ingredients, roll out thinly, and cut into rounds with a

Photographs on this page and on page 85 by Sparrow.

COMFORT & SAFETY IN THE KITCHEN

The "Step-A-Way" combination step ladder and stool is a necessity in your home.

YOU NEED it as a stool to take the ache out of long hours in the kitchen.

YOU NEED it to bring your top shelves within easy, SAFE distance.

HOW MANY times in the past few months have you wanted a safe simple step ladder in your home?

All your friends will admire your "Step-A-Way" step stool.



← THE STEP-A-WAY AS A KIDDIES' CHAIR!
Just one more useful job that this versatile piece of furniture does so well.
If a genuine "Step-A-Way" is not available in your area post this coupon today.

To H. C. Urlwin Ltd.,
P.O. Box 685, Christchurch.
I enclose £7/10/-; please send me a "Step-A-Way" by return.

NAME

PRINT

ADDRESS

PRINT

Colour preference



You value
your
dogs—
your
dogs need

BONNY
dog biscuits

* AS Supplied to
the dogs accompanying
the Ross Sea Expedition.

Working dogs need plenty of nourishment and plenty of pep to do their job properly. And concentrated nourishment is what they get from Bonny Biscuits—red meat, bone, fat and other important food elements. All dogs like Bonny Dog Biscuits—and they cost very little.

From all stock and station agents in 56-lb. and 28-lb. bags.

1.6

BONNY
DOG BISCUITS

Manufactured by Bonny Products Ltd., Palmerston North; and distributed by Salmund and Spraggon Ltd. Wellington.

Two to delight
and so easy
to make.



4168

4169

Academy
Patterns

A7.

biscuit cutter. Take half these rounds and from each cut a small circle from the centre, leaving a ring. Bake the rounds and the rings on a greased tray in a hot oven (400 degrees F.) until lightly browned (about 8 minutes). Cool, spread the rounds with jam, and dip the rings in glaze icing. Place the rings on top of the rounds so that the jam shows through the centre.

Glaze Icing

4oz. of icing sugar 1½ tablespoons of
A few drops of warm water
almond essence

Put the sieved icing sugar and flavouring in a saucepan and add the water very gradually. Cook slowly until warm, but do not let the mixture become too hot.

Ginger Biscuits

2½oz. of golden syrup 1½oz. of butter
½ tablespoon of ½ teaspoon of
ground ginger bicarbonate of soda
8oz. of flour ½ teaspoon of salt
(Yields about 60)

Heat the golden syrup and pour it over the butter. Add the sifted dry ingredients and mix well. Chill for 30 minutes. Then roll out as thinly as possible on a floured board. Cut into rings with a biscuit cutter, put on a greased tray, and bake in a moderate oven (375 degrees F.) for about 10 minutes.

Hokey Pokey Biscuits

4oz. of butter 1 teaspoon of
1 dessertspoon of bicarbonate of soda
golden syrup 1 dessertspoon of milk
6oz. of sugar 4oz. of flour
(Yields about 30)

Cream the butter and sugar. Heat the milk and golden syrup and beat in the bicarbonate of soda. Add the syrup mixture to the creamed butter and sugar and finally add the sifted flour. Put in small pieces on a cold greased tray, allowing room for the pieces to spread. Press down each piece with a fork. Bake in a moderate oven (350 degrees F.) for about 20 minutes.

Orange Fudge Cake



4oz. of butter 3oz. of desiccated
½lb. of wine biscuits coconut
(or broken biscuits) ½ cup of sweetened
Rind of 1 orange condensed milk
(Yields about 36 fingers)

Put the butter and condensed milk into a saucepan. Heat very slowly. When melted remove from the heat and add finely crushed biscuits, coconut, and grated orange rind. Press into a tin about 7in. square and ice when set.

Icing

1 tablespoon of butter 2 teaspoons of sweet-
4 teaspoons of orange ened condensed milk
juice 5oz. of icing sugar

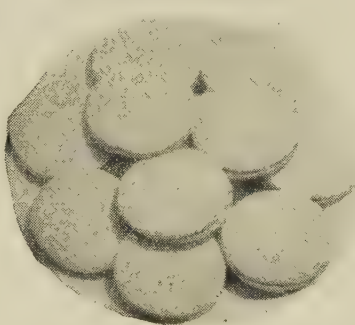
Put the butter and condensed milk in a saucepan and when the butter has melted remove from the heat and stir in icing sugar and orange juice alternately. Spread over the fudge cake before the icing is quite cold.

Orange Crackles

7oz. of butter 3oz. of sugar
7oz. of flour 2oz. of breakfast
1 dessertspoon of flakes
orange juice
(Yields about 48 pieces)

Cream the butter and sugar, work in the flour, add the breakfast flakes, and mix with orange juice. Put in small pieces on a cold tray. Bake in a cool oven (250 degrees F.) until golden brown. When cool, ice with orange butter icing.

Red Currant Shorties



3oz. of flour 1 drop of lemon
2oz. of butter essence
Red currant jelly Icing sugar
1oz. of sugar

(Yields about 24 biscuits)

Mix the flour and sugar and rub in the butter and lemon essence until the mixture binds together. Turn out on to a lightly floured board and knead until the mixture is very smooth. Then roll out **very** thinly; this can be done only if the mixture has been well kneaded. Cut into rounds. Place on a greased tray and bake in moderate oven (375 degrees F.) for about 7 minutes. The biscuits should remain very pale. Lift carefully on to a rack, cool, and when cold sandwich together with red currant jelly and dust with icing sugar. The finished biscuits should be very thin.

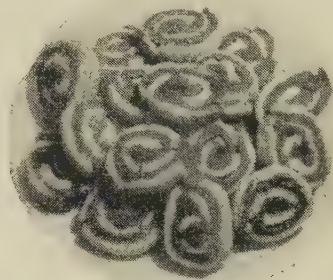
Sante Biscuits

4oz. of butter 2oz. of sugar
4 teaspoons of sweet- 6oz. of flour
ened condensed milk Two 3d. cakes of dark
1 teaspoon of baking chocolate
powder
(Yields about 30)

RECIPES WITHOUT EGGS

Cream the butter and sugar, add condensed milk, and beat thoroughly. Add sieved flour and baking powder and lastly mix in the chocolate roughly chopped. Put in spoonfuls on a cold greased tray. Press flat with a fork and bake in a moderate oven (375 degrees F.) for about 15 minutes or until a golden brown.

Whirligigs



3oz. of butter 3oz. of sugar
6oz. of flour ½ teaspoon of baking
1 tablespoon of cocoa powder
1 tablespoon of milk ½ teaspoon of vanilla
(approx.) essence
½ teaspoon of salt
(Yields about 36 biscuits)

Cream the butter and sugar. Add sifted flour, baking powder and salt, vanilla essence, and sufficient milk to make a stiff paste. Divide the mixture. Blend the cocoa thoroughly into one half. Roll out both halves thinly into equal rectangles. Place the chocolate piece on the white piece and roll up tightly as for a Swiss roll. Leave to stand in a cool place for 30 minutes; then cut in slices about ¼in. thick. Place on a greased tray and cook in a moderate oven (375 degrees F.) for 12 to 15 minutes.

Spanish Delights

4oz. of sugar 8oz. of flour
½ pint of cream ½ teaspoon of
4oz. of cornflour bicarbonate of soda
½ teaspoon of almond ½ teaspoon of grated
essence orange rind
4oz. of melted butter
(Yields about 60 biscuits)

Stir the sugar into the melted butter and add the cream. Sift and fold in the rest of the dry ingredients and flavourings. Put in spoonfuls on an ungreased tray and flatten with the back of a fork. Bake in a moderate oven (375 degrees F.) until light brown (15 to 20 minutes). This makes a very light biscuit.

Walnut Dreams

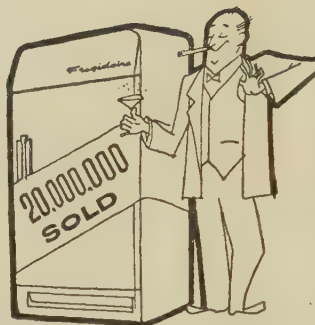
8oz. of butter 4oz. of chopped
8oz. of flour walnuts
4oz. of icing sugar
(Yields about 60 biscuits)

Cream the butter and icing sugar well and work in the sieved flour. Add the nuts. Roll out to ¼in. thickness on a board well floured with a mixture of

do you know...?



That food spoils all the year 'round? A kitchen warm enough to be comfortable is too hot to keep food! You need a Frigidaire Refrigerator—even in the winter-time.



That most people describe just **any** refrigerator as a frigidaire? This is because Frigidaire is the most popular refrigerator in the world! Over 20 million Frigidaire units have been built and sold!



That a Frigidaire offers you more room **inside** for less outside space? A Frigidaire is so roomy—there's space for everything!



That people think about buying their Frigidaire only when the weather gets hot and the butter melts?



That the wise thing to do is choose Frigidaire—built and backed by General Motors! And it's better still to consult your Frigidaire dealer and buy yours **now!**



FRIGIDAIRE

REGISTERED TRADE MARK

BUILT AND BACKED BY GENERAL MOTORS

G.9178

icing sugar and flour. Cut into rings and put on to a cold tray. Bake in a hot oven (400 degrees F.) for about 10 minutes.

Savoury Biscuits

For a change biscuits and cheese can be served instead of a pudding. Two

Celery wafers →
with an accompanying selection of cheeses.

savoury biscuit recipes that are excellent served with butter and a selection of cheeses are as follows:—

Celery Wafers

4oz. of wholemeal flour
1 packet of celery soup base
1 tablespoon of water (approx.)
4oz. of flour
4oz. of butter
(Yields 48 wafers)

Combine sifted flour, wholemeal flour, and celery soup base in a basin. Rub in butter and use sufficient water to make a stiff dough. Roll out very thinly (about $\frac{1}{16}$ in. thick). Cut into fingers. Bake in a moderate oven (350 degrees F.) for about 15 minutes.

Cheese Squares

4oz. of flour
2oz. of grated cheese
 $\frac{1}{2}$ teaspoon of salt
2oz. of butter
2 teaspoons of milk
1 teaspoon of baking powder
(Yields about 36 squares)

Rub the butter into the sifted dry ingredients. Add cheese and mix to a stiff dough with milk. Roll out very thinly. Cut into squares, prick with fork, and bake on a greased tray in hot oven (400 degrees F.) for 10 minutes.

Cakes

Cakes made without eggs will not have the light texture associated with good butter cake or fruit cake mixture. They will be comparatively heavy and of closer texture. Nevertheless the following recipes are all good stand-bys for times when eggs are in short supply.

Eggless Chocolate Cake

10oz. of flour
2 teaspoons of bicarbonate of soda
1 tablespoon of cocoa
1 cup of milk
8oz. of sugar
4oz. of butter
 $\frac{1}{2}$ cup of golden syrup
 $\frac{1}{2}$ teaspoon of vanilla essence

Sift the flour and cocoa together and dissolve the soda in half the milk. Put

WHEN THERE ARE NO EGGS ON HAND



[Sparrow

the sugar, syrup, butter, and the other half cup of milk in a saucepan and heat until all the ingredients are dissolved. Add the flour and cocoa, together with the soda dissolved in milk, and the vanilla. Beat until smooth. The finished mixture is very thin. It is advisable to line the tin with greaseproof paper. The mixture can be baked in two sponge tins or in a large baking dish. Bake in a hot oven (400 degrees F.) for about 20 minutes. When the cake is cool the two halves (or the large piece cut in halves) should be sandwiched together with whipped cream and iced with chocolate icing.

Apple Fruit Cake

1 tablespoon of cocoa
8oz. of flour
8oz. of mixed fruit
1 tablespoon of hot water
1½ cups of stewed apple with as little liquid as possible
4oz. of white sugar
2 teaspoons of mixed spice
8oz. of brown sugar
 $\frac{1}{2}$ teaspoon of bicarbonate of soda
1 tablespoon of melted butter

Sift the flour, cocoa, and spice, and add the brown sugar and cleaned fruit. Combine the apple, white sugar, and melted butter and add to the dry ingredients. Finally add the bicarbonate of soda dissolved in the hot water. Stir well. Put in a lined, greased cake tin (7½ in. diameter) and bake in a moderate oven (325 degrees F.) for 1½ hours. If possible, keep this cake for a week before cutting.

Chocolate Oatmeal Cake

3oz. of rolled oats
1½ tablespoons of cocoa
 $\frac{1}{2}$ cup of milk (approx.)
5oz. of flour
4oz. of butter
1 teaspoon of baking powder
4oz. of sugar

Rub the butter into the flour. Add the sifted cocoa and baking powder together with the rolled oats and sugar. Mix to a fairly stiff consistency with the milk and put into a well-greased 6½ in. diameter cake tin. Bake in a moderate oven (375 degrees F.) for about 20 minutes or until the cake starts to leave the sides of the tin. If possible, keep 24 hours before cutting and ice the next day.

Icing

1½ tablespoons of butter
2 tablespoons of hot water
6oz. of icing sugar
1 tablespoon of cocoa
 $\frac{1}{2}$ teaspoon of vanilla essence

Mix the butter, cocoa, vanilla, and half the sieved icing sugar. Add the remainder of the icing sugar alternately with the water, finishing with icing sugar.

Puddings

Steamed Sago Pudding

4 tablespoons of sago
2oz. of fresh breadcrumbs
2oz. of dates
2 tablespoons of milk
8oz. of milk
1 cup of raisins
 $\frac{1}{2}$ teaspoon of bicarbonate of soda
(6 to 8 servings)

Soak the sago in 8oz. of milk overnight. Next day add the breadcrumbs, fruit, and soda dissolved in the milk. Put in a greased basin and steam for 2½ hours. Serve with sweetened whipped cream or ice cream.

Brown Betty

2oz. of flour	1oz. of butter
2 tablespoons of breadcrumbs	1oz. of sugar
2 tablespoons of jam	1 teaspoon of bicarbonate of soda
8oz. of milk	

(4 to 6 servings)

Rub the butter into the flour and add breadcrumbs, sugar, and jam. Dissolve the soda in the milk, mix together, and put into a greased basin. Steam for 2½ to 3 hours. Serve with jam sauce or cream.

Spiced Date Pudding

8oz. of milk	1 cup of chopped dates
4oz. of flour	
1 teaspoon of mixed spice	1 teaspoon of bicarbonate of soda
1 tablespoon of butter	4oz. of sugar

(4 to 6 servings)

Put the butter and milk in a saucepan and bring to the boil. Remove from heat and sift flour, soda, and spice. Add these, together with the sugar and dates, and mix quickly. Put in a greased basin and steam for 2 hours.

Chocolate Fudge Pudding

4oz. of flour	½ teaspoon of baking powder
½ teaspoon of salt	
6oz. of sugar	2 tablespoons of cocoa
4oz. of milk	
½ teaspoon of vanilla essence	½ cup of chopped raisins and dates
1 tablespoon of butter	

(6 servings)

Sift the dry ingredients and add the milk, vanilla essence, and melted butter. Mix until smooth. Add the fruit. Put the mixture in a greased oven glass or ovenware dish and pour over the following topping:—

Topping

1½ cups (14oz.) of hot water	6oz. of brown sugar
	3 tablespoons of cocoa

Mix the brown sugar and cocoa and sprinkle them over the top of the pudding mixture. Finally pour the water carefully over all the pudding. **Do not stir.** The water goes to the bottom of the dish and forms a thick chocolate sauce. Bake in a moderate oven (350 degrees F.) for 50 minutes. Serve with ice cream or plain cream.

Peach Crunch

2oz. of flour	Cooked sliced peaches
4oz. of rolled oats	3oz. of brown sugar
1 teaspoon of cinnamon	½ teaspoon of salt
	4oz. of butter

(6 servings)

Combine the dry ingredients and mix them with the melted butter. Press into an 8in.-diameter plate or sponge tin, keeping back half a cup of the mixture. Cover thickly with the cooked, sliced peaches (drained). Sprinkle with remaining mixture and bake in a moderate oven (375 degrees F.) for approximately 20 minutes. Serve with a sauce made with thick-



[Sparrow

Chocolate oatmeal cake being stored in a tin. Removal of an iced cake from a tin is greatly simplified if the cake is placed on the lid and the base of the tin is put on top as shown.

ened peach juice and a few drops of almond flavouring.

Apple Charlotte

3 medium cooking apples	4oz. of sugar
4oz. of butter	Small piece of lemon rind
½ teaspoon of cinnamon	3 cups of breakfast flakes
12oz. of water (1½ cups)	1 teaspoon of sugar

(4 to 6 servings)

Bring to the boil the sugar, water, and lemon rind. Simmer peeled, sliced apples in this until they are tender. Crumble the breakfast flakes and mix with the melted butter. Line a greased oven glass dish with some of the breakfast flake mixture. Pour in the apples and cover with the remainder

of the breakfast flakes. Dot with butter and sprinkle the top with a mixture of ½ teaspoon of cinnamon and 1 teaspoon of sugar. Bake 15 to 20 minutes in a moderate oven (375 degrees F.).

Coconut Topping

1oz. of butter	1½oz. of desiccated coconut
1oz. of brown sugar	
1 cup of breakfast flakes	½ teaspoon of cinnamon

Melt the butter and add the remainder of the ingredients. Sprinkle over the top of stewed fruit; apples or rhubarb are especially good. Bake for 15 to 20 minutes in a moderate oven (350 degrees F.).

(Continued at bottom of page 90)

Bath-mat with Matching Scuffs

By ELEANOR S. CAMPBELL,
Field Officer in Rural Sociology,
Department of Agriculture, Auckland

A BATHROOM can be brightened up in a simple way by having a bath-mat to match the towels. An extra yard when roller towelling is bought can so easily be made into attractive matching bath-mat and scuffs, as shown in the illustration at right.

THE materials required are:—

- 1yd. of 18in. roller towelling
- 1 sugar bag (washed and boiled)
- 2yds. of bias binding
- Cotton
- 1 pair of inner soles (optional)

If the scuffs are to be laundered, the inner soles should be made of a rubber material and laundered according to the manufacturer's instructions.

The Bath-mat

Wash and boil the sugar bag. Unpick the stitching so that the bag opens out, fold in half lengthwise, and cut down the middle.

Cut the towelling across to get a piece 26in. x 18in.

Lay the towelling, right side down, on top of one half of the sugar bag. Trim off the excess edges and machine stitch round three sides. Then pull it inside out (towelling is now right side out and backed by sacking) and turn in the edges of the open side and machine stitch down close to the edge. If preferred, this side can be oversewn by hand.

A neat bath-mat is now ready for use. It is easily laundered, as it can be boiled or put through the washing machine if desired.

The Scuffs

The rest of the towelling and the other piece of sugar bag can be used to make a neat pair of scuffs.



[Sparrow

Take a pair of inner soles, the required size, and cut the shape of each one from the towelling, about 1in. larger all round. If inner soles are not available, use a pair of flat sandals to get the size and shape.

Cut identical shapes from the piece of sacking.

Next, with some bias binding (fairly wide if possible) place the pieces of towelling right side up on the sacking, bind the edges all round with the bias

binding, and then machine stitch neatly round the edge. Be sure that the binding is caught in the stitches on both sides.

If a firmer base is required, an inner sole can be placed between the towelling and sacking.

Finally, cut two strips of towelling, about 7in. x 3in., bind the edges with the bias binding, and sew the strips firmly to the outer and inner edges of each scuff so that the loop comes over the front of the foot.

When There Are No Eggs

(Continued from page 89)

Delicious Baked Apple

Peel, core, and cut into quarters the desired quantity of apples. Cover with the following mixture:—

- | | |
|-----------------------|-------------------|
| 1 tablespoon of flour | 1 tablespoon of |
| 4oz. of sugar | butter |
| 1 tablespoon of | 8oz. of hot water |
| golden syrup | |

Rub the butter into the flour. Add the sugar and golden syrup. Stir in the hot water and pour the mixture over the apples. Bake in a moderate oven (350 degrees F.) for about 45 minutes or until the apples are soft.

Ginger Crunch

- | | |
|-------------------------------|------------------------------------|
| 1 tin of apricots | 3 tablespoons of |
| (16oz.) or the | brown sugar |
| equivalent amount | $\frac{1}{2}$ teaspoon of allspice |
| of stewed apricots | $\frac{1}{2}$ teaspoon of |
| $1\frac{1}{2}$ cups of ginger | cinnamon |
| biscuit crumbs | 3 tablespoons of |
| (approx. 20 | butter |
| biscuits) | |

(6 servings)

Drain the apricots and arrange the halves in a sponge tin about 8in. in diameter. Mix the butter and sugar and then add biscuit crumbs, cinnamon, and allspice. Sprinkle evenly over the apricots and bake in a moderate oven (375 degrees F.) for 25 minutes. This can be served warm or cold and is an especially good accompaniment for ice cream.

Basic Mix for Ice Cream

- | | |
|--------------------------------|----------------|
| 1 quart of milk | 16oz. of sugar |
| $\frac{1}{2}$ teaspoon of salt | 4oz. of flour |

Mix the flour to a smooth paste with a little of the milk. Then add the remaining milk together with the sugar and salt. Bring this to the boil. It is important to stir constantly, as otherwise the mixture will go lumpy. Cool and store in the refrigerator. (This mix will keep for at least a fortnight in a refrigerator.)

When ice cream is required use 1 cup of the base and 1 cup of cream and whatever flavouring may be desired. Beat all together and freeze for 2 to 3 hours. Beat again 1 hour before serving.

Shoes for Children

By MAUD B. STRAIN,

Field Officer in Rural Sociology,
Department of Agriculture, Dunedin



[National Publicity]

BADLY fitting shoes in childhood and adolescence are the foundation for foot troubles in later life. Because a child's foot is flexible, a badly fitting shoe can be worn without causing pain to the wearer, and once the feet are deformed the damage cannot be undone. A sensible adult whose feet have developed naturally through childhood and adolescence will not from choice wear a shoe that is too short, too narrow, or has too high a heel. If the feet are looked after carefully during the vulnerable period, adult feet will safeguard themselves by unrelenting protest against the pain and discomfort of badly fitting shoes.

BUYING shoes for children is not easy, because a child may be attracted by a particular pair of shoes which he will want irrespective of whether they are the most suitable for him, or, perhaps, he may not be interested in shoes and may be im-

patient to be out of the shop. In either case the choice of a suitable pair of shoes must be made by the mother with the help of the shop assistant. Most shops have a trained and experienced fitter and it is well to be guided by his advice.

As much attention as is consistent with good fit should be paid to the

child's wishes, because he will be much happier in shoes that he likes. When possible it is advisable to buy children's shoes always at the same shop, as the child then becomes familiar with the surroundings and the assistants and will not be handicapped by fear or shyness. The assistant will bring forward only the type and style of shoe which he knows from past experience will be likely to suit, and the child is not so likely to set his mind on an entirely unsuitable shoe. The child will soon realise that when he goes into that shop he will get new shoes even if he does not have the first pair he tries on.

The qualified fitter from his training and experience will often recognise the need for corrective or remedial foot treatment before the mother or child realises that anything is radically wrong. If he suggests it, medical advice should be sought without delay, because the sooner treatment is begun the more chance there will be of complete cure.

FITTING

Toddlers' Shoes

Shoes (and socks) should be chosen with an understanding of the child's foot as a basis. The feet of the infant and the toddler are usually cushioned in fat that brings the entire sole of the foot in direct and complete contact with the floor. Later this fat will disappear and the arches of the feet will form.

In these early years the feet should be bare and unrestrained as much as possible and neither socks nor shoes should alter the inner lines of the



A lace-up, heelless shoe for toddlers.



**SELWYN
GUMBOOTS**

**PUT
YOURSELF
IN
HIS
BOOTS**

Put yourself in his boots . . . What would YOU be wearing on your feet if you were mustering stock on a really bad day . . . and the yard was inches deep in mud. If you're wise, you'd be wearing Marathon Gumboots. Marathon are fine when the weather is wet . . . they're built to take it in their stride, and to give you real, "day-long comfort" month after month . . . year after year.

Over Ten Million pairs of rubber
footwear have already been
manufactured by Marathon.

Marathon
BY SKELLERUP

GUMBOOTS

feet. Freedom of the big toes is most important in babyhood to insure sound foot health later.

Shoes should have a flexible shank, the toe should be broad, and the inner line of the sole should be long and straight. It is usual to recommend that shoes extend at least $\frac{1}{2}$ in. to $\frac{3}{4}$ in. beyond the big toe. Shoes for the baby beginning to walk should have a firm sole and some support for the ankle.

Children's Shoes

Children's shoes require expert fitting to ensure that the natural shape of the foot is not in any way cramped or distorted. Sufficient length is the most important single requirement. When shoes are new there should be $\frac{3}{4}$ in. clear toe space inside each shoe between the tip of the longest toe and the end of the shoe.

The foot should be measured whenever new shoes are bought and it is important to stand up and walk a few steps in the shoes. A foot may be measured with little or no weight on it, but in walking and running the foot elongates by as much as a size. Freedom of movement of the foot within the shoe during activity is essential;

A sturdy, well-shaped, lace-up shoe for a 12-year-old or 13-year-old. The shoe has a straight inner edge, roomy toe, and is high cut with adjustable lacing to hold the instep firmly.



otherwise the toes may be distorted, the joints stiffened or enlarged, or the muscles weakened. Children's feet grow rapidly, perhaps a full size in 6 to 12 months.

Before having shoes resoled make sure the shoes will normally be long enough for the whole duration of wear of the new sole; if they are likely to

SELECTING SHOES FOR CHILDREN



Shoes for the 4-year-old or 5-year-old. Strap (adjustable) shoe for girls and lace-up shoe for boys. These shoes give a straight line from heel to toe and plenty of width across the toes.



Diagram from X-ray photographs comparing child's foot (left), in which the bones are still soft and vulnerable, with the foot of an adult.

be too short before the sole wears out, discard the shoes rather than risk distorting the child's foot.

Toe Shape

All the toes should have complete freedom to move separately as well as together. They have an important part in all bodily activities where the feet are used and they can only play this part successfully and be well shaped and strong muscularly if they are free to function naturally. In the choice of shoes fit, not appearance, is of primary importance.

Width

Adequate width in shoes is essential. There should be no pressure on the

little toe or cramping of the foot in its widest part, which is from the big joint of the big toe to the end joint of the little toe. Shoes can be too roomy, when besides becoming unsightly with deep creases in the leather they are uncomfortable, and in winter they are colder than a snug-fitting shoe.

Over the instep the shoes should hug the feet firmly, with an opening of little more than $\frac{1}{4}$ in. at the top of the lacing.

Heel and Ankle

Shoes should grip the foot lightly though firmly round the heel, because here and round the instep the foot is

SHOES FOR CHILDREN . . .

held and prevented from sliding forward. The tops of the shoes should not be high enough to cut in below the ankle bones; there should be just sufficient room to insert the tip of the finger between the ankle and the top edge of the shoe.

There should be no movement of the heels in the shoes when the heels are raised, as any movement here will wear out socks and even cause blisters on the heels. After the shoes have been worn for some time the ankle may roll inward, throwing too much weight on the inner side of the foot, which could cause flattening of the arch. This in turn could affect the way a child stands and walks.

A child should be able to stand and walk comfortably in new shoes. They may be stiff at first, but if any breaking-in is needed, the shoe is not a good fit. Lace-up shoes are most suitable for general wear, because they provide support in all places where it is needed. However, sandals are suitable in warm weather and for beach wear, and light shoes and slippers for indoor wear.

Best Use from New Shoes

The practice of keeping one pair of shoes for best wear is not advisable with children, as their feet grow so quickly that the shoes may be too small by the time they are taken for general wear. A better practice is to let a child wear his new shoes immediately but alternately with the older pair, since shoes last longer and keep their shape better if they are allowed to dry out thoroughly between wearings. If new shoes are worn at once, there is less chance of them



Good school shoes for girls. They are welted shoes with rubber soles, strong but pliant leather (beautifully tanned), and an adjustable instep strap for snug fit.



Diagram from an X-ray photograph showing an entirely suitable shoe for a child. The inside edge is straight and there is ample length and sufficient width for the toes to be moved independently.



Diagram from an X-ray photograph showing a shoe that is too short. The toes are crowded together and the inner side is not straight.

being too small before they are worn out.

Children can easily have their feet moulded into the wrong shape by short and badly fitting shoes or socks, because the bones of the feet are not fully hardened until the age of 18 years or later. In a child's foot the bones have a large proportion of cartilage, which is comparatively soft and compressible.

This explains why children may not feel discomfort even though harm is being done to their feet by shoes they have outgrown. (The discomfort comes later with corns, calluses, bunions, hammer toes, and other deformities.)

SELECTING SHOES FOR CHILDREN

If the shoe shop has X-ray equipment, it should be used to check the width and length while the child is standing. However, other methods may be used; for example, the child stands on a piece of cardboard longer than his foot and a pencil mark is made on the cardboard at the end of the longest toe and another at the back of the heel. A strip of the cardboard about $\frac{1}{2}$ in. wide is cut out of the full length between the two marks. This is inserted in the shoe, and when one end is pushed up to the toe the other end should be $\frac{1}{2}$ in. to $\frac{3}{4}$ in. short of the back of the shoe.

The inside line of the shoe should be straight along the inside edge right up to the big toe; then the greatest length will be at the big toe instead of at the third toe as happens in pointed shoes. The width, length, and height above the toes should be such that the toes can move naturally when the child is walking or standing.

Heels should be flat; even teenagers' walking shoes should have low heels. High heels force the foot forward into the toe of the shoe and produce the same effect as insufficient length. The weight that should be taken by the heel is thrown forward on to the ball of the foot and this tends to enlarge the toe joint. If at the same time the shoe has a pointed toe, the effect will be emphasised and will produce bunions in later life. High heels also cause posture defects, because they upset the natural balance of the body.

In warm weather it is good for children to be barefooted on sand, grass, or anywhere where they are not likely to hurt their feet, but if a child is having foot treatment necessitating specially made or built-up shoes, he should wear them all the time.

A child should not be expected to wear shoes handed down from an older brother or sister, because it is unlikely that the two children's feet will be so similar that the one pair of shoes is a good fit for both children.

CONSTRUCTION

Research has been carried out on shoe construction, of which there are two main types, welt and stitch down. The latter method is used generally in sandals and the cheaper shoes. One disadvantage is that where the insole is glued rather than stitched in place considerable curl and deformation can occur if the soles get wet. In welt construction the insoles are sewn down and show better resistance to such deformation.

The best leather soles have been found to be better than any of the synthetics, since all the synthetics tend to spread or creep. Sometimes the creep is serious enough to break stitches and loosen the sole.

The counter, the concealed stiffener at the back of the heel between the outer leather and the lining, is most frequently made of fibre board instead



Well-made, well-fitting sandals for a 10-year-old.

of leather. This is no disadvantage; fibre board retains its shape excellently.

CARE OF SHOES

Very few children give even a passing thought to being careful with their shoes. Usually these are subjected to really hard wear and any care the shoes receive is given when they are off the feet.

Wet shoes should be wiped with a damp cloth to remove mud and then dried at room temperature. They must not be dried by heat of any kind, because heat dries out oil from the leather and causes it to crack. Damp shoes should be stuffed with paper to help keep the shape and dried in a draughty place. When dry they should be cleaned with polish before being worn.

Regular cleaning after each wearing helps to preserve the leather and prolong the life of the shoes. Any wear that calls for repairs will be noticed on shoes which are cleaned frequently before the shoes become badly worn. Toe caps and heel plates give a certain amount of protection to outdoor shoes, but these should be inspected regularly and renewed when they have

worn thin. Nasty cuts and tears can result from jagged caps or plates.

SHOES TO SUIT THE WEATHER

Children need shoes to suit the weather: Stout leather shoes for winter with goloshes or gumboots for wet days and sandals for summer or indoor wear. Goloshes and gumboots are for outside wear only and should be removed in the house or classroom, as they do not allow perspiration to escape and thus keep feet colder than need be in winter.

IMPORTANCE OF CORRECTLY SHAPED SOCKS

Incorrectly fitting socks can do much permanent damage to the shape of children's feet. If the socks are tight or too short, they exert gentle but steady pressure, particularly on the big toes. As the bones of young feet are still sufficiently flexible to give way to such steady pressure, a permanently deformed foot can easily result. Loose socks of the right shape can be as important as the best shoes obtainable in preventing later foot troubles.



Bedding Plants in Flower Garden

IN many parts of New Zealand bedding plants can be flowered throughout the year. Compared with other plants they are quickly established and soon provide a colourful display; they are therefore grown in nearly every garden. In this article K. H. Marcussen, Horticulturist, Department of Agriculture, Christchurch, discusses the various types of bedding plants and how they should be used to the best advantage. Notes on garden work for August are by Rosalie A. Campion, Horticultural Instructor, Department of Agriculture, Wellington.

NOT all bedding plants are true annuals, but most are treated as such because they give a more colourful and even display during their first year. Some bedding plants, such as antirrhinum, salvia, and frilled petunia, can be cut back after flowering to encourage further flowers. That can sometimes be done in a mixed border, where symmetry of the plants is not so important, but in a separate bed it is seldom satisfactory.



BEDDING PLANTS IN FLOWER GARDEN

Annuals must perpetuate themselves by seed; once seed is being produced on an annual flower plant the quality of blooms deteriorates and its life is shortened. To keep a display of annuals, spent blooms should there-

← Livingstone daisy (*mesembryanthemum*) is a very colourful annual suitable for dry and sunny places. Elliott photo.

fore be removed whenever it is possible, even if this is a tedious and often difficult job.

Types

Bedding plants are generally described according to type. The term annuals is used haphazardly and often includes many plants which botanically are not annuals. The following definitions are commonly used:—

Hardy comprise the largest group. These subjects can be grown anywhere in the country without protection of glass and many are better sown in the position in which they are to flower, and thinned instead of being transplanted.

Half-hardy bedding plants will not tolerate winter conditions in colder districts, where they are generally most satisfactory when raised under glass. They can then be planted out in late spring or early summer, when the soil has warmed up. Many of the plants used for summer displays in southern districts come into this group, but in the warmer districts they can be treated as hardy.

Tender subjects generally require protection until they have reached the planting out stage. They should not be planted in fully-exposed positions. Adequate shelter and in some places partial shade should be provided for best results.

Biennials are a group of plants which generally do not flower until the second season. They are usually raised from seed sown in late summer, left to develop during winter, and come into flower early the following summer; Canterbury bells, for example. Some perennials are grown in the same way and could be left in for several years, but the first flowering is usually the best. Sweet William

← An attractive drift of *Primula malacoides*.

and Brompton stocks are typical of this type.

Some bedding plants which are grown this way in northern European countries can be raised and will flower in one season in New Zealand, as the season is longer, especially in northern districts. Bedding carnations, for example, can be overwintered as young plants in colder districts, but will



Polyanthus and tulips make a suitable display for this type of building.

flower from midsummer on if sown under glass in early spring.

Perennials and shrubs are also used for bedding displays and can provide attractive and unusual arrangements. Young plants are generally most satisfactory. Delightful displays can be made with hydrangeas, fuchsias, *Cuphea ignea* (cigar plant), and heliotrope. Geraniums are unparalleled in the colder districts where cuttings

rooted in early autumn and wintered in a glasshouse or in frames will give a floral display during the whole of the next summer. Bedding dahlias which are raised from seed have become popular.

Shrubs can sometimes be used as standards; either among similar plants or as spot-plants for contrast, bringing height into an arrangement.



The spider flower (*Cleome spinosa*) is useful for massive arrangements.

[Elliott



▲ Candytuft (*Iberis*), which makes a good display for a short period, is best sown where it is to flower. Elliott photo.

▼ Borders with bedding plants soften the hard outline of concrete paths and drives.



Bulbs and corms are used for bedding displays and are then generally interplanted with other plants, so that the flowering season of the bed or border is extended. Though by this means a better display can be obtained, it is frequently to the detriment of the bulbs. Plants used for interplanting are often hosts for aphids and thrips, and such infestations may cause spread of virus diseases in the bulbs and corms. Furthermore, bulbs and corms can seldom be lifted at the correct time and will consequently suffer.

Use of Bedding Plants

Formal Beds

The advantage of using bedding plants is that displays can be planned for special occasions and the arrangement can be altered every time the beds are replanted.

When a formal bed is being planned subjects which have a long flowering period should be chosen. Several months will pass from planting before flowering begins. If subjects such as cornflower or candytuft are used, the display will soon be finished, but plants such as petunias, phlox, and salvias will flower most of the season.

Annual Borders

In contrast to formal beds annual borders may be planted up with bedding plants. Here the plants need not be set out in the same way as for a formal display. Greater variation can be made and the flowering season of the border extended by the use of early as well as late flowering subjects.

Some gardeners plant these annual borders with specific plants in groups or drifts to give bold displays of colour here and there. The advantage of this method is that when a batch of plants have finished flowering they can be pulled out, and after adequate soil preparation a new batch

planted. In northern areas this will ensure flowers in the border throughout the year.

This method will not be so satisfactory in districts where growth is decidedly slowed up in winter, as few bedding plants will flower during winter in such districts, and spring and summer bedding is practised. Various bedding plants can be interplanted, so that early subjects will provide colour while later flowering ones develop. This demands great care in planning, but excellent examples can be seen every year in many home gardens in southern centres.

Mixed Borders

The mixed border provides a situation where bedding plants can be used to advantage; herbaceous perennials have seasonal flowering and judicious use of bedding plants can enhance its beauty. Hardy bedding plants, which are best sown in the position where they are to flower, fit well into the layout of the mixed border.

Other Parts of the Garden

Some of the dwarf bedding plants will be found useful to provide additional colour in the rock garden. Permanent plants should not be smothered and it is generally wise to use only subjects which do not seed prolifically or seedlings may become a nuisance in future years.

Some annuals can also be used between stepping stones. Livingstone daisy (*mesembryanthemum*) and portulaca are often used; it should be remembered, however, that though they do well in such situations, they are not suitable for walking on.

Bedding plants used between bulbs not only extend the flowering season, but the number of bulbs required for a bed can be reduced. Best results are generally obtained if contrasting colours are used, as the flowers from the bulbs will then show up more distinctly.

A new shrubbery will not look very spectacular for several years after planting. Interplanting with bedding plants is very satisfactory, provided the temporary plants are kept well out in the open spaces. Not only should adequate space be left for the shrubs to develop, but there should be no competition for plant food and moisture.

Window boxes and tubs can be planted up with bedding plants and have special uses. Sometimes it is more convenient to keep the containers in a reserve area where they can be given better care and protection than might be the case if kept in the position in which they eventually will be used.

BEDDING PLANTS IN FLOWER GARDEN

Many bedding plants provide good cut flowers. Formal beds are not a good source of supply, as the removal of some flowers may unbalance the arrangement, but the annual border and particularly the mixed border provide good scope. When the display for the season is planned enough suitable subjects should always be included to ensure the normal supply of cut flowers for the home.

Raising the Plants

Some bedding plants do best when sown directly in their flowering position, thereby avoiding any check to growth through pricking out and transplanting. In this group are the ones which flower for a fairly short period, such as candytuft, cornflower, linaria, mignonette, night-scented stock, and shirley poppy, and for most true annuals it is claimed to be the best method.

Bedding plants, which flower for an extended period, usually grow better if pricked out and transplanted, because a more compact root system will then develop. By this method more plants can be raised in a confined area and in glasshouses seed boxes are almost universally used and are very satisfactory.

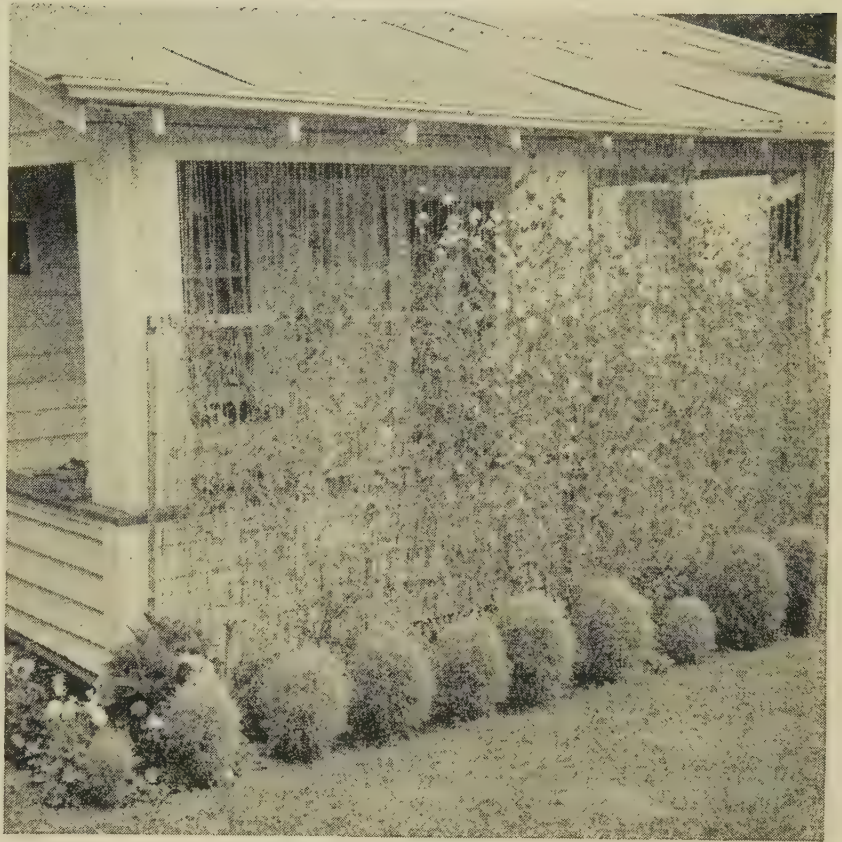
Raising of plants from seed was dealt with in an article on propagation in the December 1956 issue of the "Journal", but it cannot be stressed too often that only by giving adequate attention and care to young seedlings can the best flowering be expected. It is important that seedlings do not become drawn. Sufficient spacing should be allowed either through pricking out, transplanting, or thinning.

It is generally false economy to use cheap or old seed. The facilities required and the labour spent in raising the seedlings are the same, but good seed germinate well and first-class plants true to type and colour should result; not always so when cheap or old seed is used.

Preparing and Planting

No plants can be expected to develop to their best without proper preparation of the soil before sowing or planting. Bedding plants are no exception, but because they are short lived, such cultivation is often curtailed.

Lack of organic matter is common in flower beds and borders and if the climate is favourable, many plants can be grown on a supply of artificial fertilisers. Dry periods, however, are often the test of a good soil. Where a soil contains adequate organic matter the plants have better roots and whether watering is carried out or not, the plants are able to obtain more moisture. When watering is carried out a soil rich in organic matter will absorb the water much better and will not pack tightly nor will it crack when drying out afterward.



Sweet peas providing a floral screen for the veranda.



[Campbell]
Bedding plants should be handled with greatest care when being transplanted.

It is good practice to dig in a small dressing of animal manure or compost every time a batch of plants is removed from a flower bed.

Soil improvement and manuring in the flower garden were dealt with in the October and November 1956 issues of the "Journal".

Seedlings should never be planted out in a dry soil. If necessary, a good watering should be given the day before and the topsoil worked up lightly before planting. The operation of planting will be made easier and the check to the root system of the plants minimised.

Handling of plants should be done carefully. They should have been well watered some hours before and be lifted with as much soil as possible adhering to their roots.

Depth of planting can usually be slightly deeper than in the seedling box or bed, except for subjects which have their leaves in a rosette, such as Iceland poppies, which should never have the crown covered.

Spacing will vary according to the type of plant, but nothing is to be gained by planting too closely; otherwise the plants may develop weakly

Bedding Plants Brighten the Flower Garden

Name	Colour	Height in.	Hardiness	Sowing time		Sowing method	Planting time		Distance apart in.	Situation	Soils	Flowering period	
				North	South		North	South				North	South
<i>Ageratum</i>	blue	3-18	Hardy							Average	Average		
<i>Alyssum</i>	mauve, white	4	Hardy	Aug. all year	Sep. Oct.	Direct in border	Oct.	Nov. Oct./Nov.	6-10	Sun	Moist	Nov.-Apr. all year	Dec.-Apr.
<i>Anarrachis</i>	various	12-30	Hardy	Sep. Mar./June	Oct. Aug.	Under glass	Oct.	Nov. Oct.	8	Average	Dry	Nov.-Apr. all year	Nov.-Apr.
<i>Anthrinum</i>	various	12-36	Hardy	Sep. Oct.	Oct. Aug.	Direct in border	Apr./July	Nov. Oct.	10-15	Sun	Moist	Aug.-Nov.	Feb.-Apr.
<i>Arctostaphylos</i>	various	9	Hardy	Sep. Oct.	Oct. Aug.	Direct in border	Oct.	Nov. Oct.	12	Shade	Average	Dec.-Mar.	Dec.-Mar.
<i>Aster</i>	blue, red, white	18	Hardy	Aug. July	Sep. Aug.	Direct in border	Nov.	Nov. Oct.	12	Sun	Average	Jan.-Mar.	Jan.-Mar.
<i>Balsam</i>	pink, red, white	12	Hardy	July	Aug.	Direct in border	Oct.	Nov. Dec.	10	Sun	Average	Dec.-Mar.	Dec.-Mar.
<i>Begonia, fibrous-rooted*</i>	red, yellow	8	Hardy			Direct in border	Nov.	Dec.	8	Sun	Average	Nov.-May	Dec.-May
<i>Begonia, multiflora*</i>	various	15	Hardy			Direct in border	Nov.	Dec.	9	Sun	Average	Dec.-May	Dec.-May
<i>Begonia, tuberosa*</i>	various	15	Hardy			Direct in border	Nov.	Dec.	12	Sun	Average	Jan.-Apr.	Jan.-Apr.
<i>Bells of Ireland (Molacca balm)</i>	green	18	Hardy			Direct in border				Sun	Average	Jan.-Apr.	Jan.-Apr.
<i>Calendula</i>	orange, gold	18	Hardy	Aug. Feb.	Sep. Sep.	Direct in border	Mar.	Nov.	10	Sun	Average	Jan.-Feb.	Feb.-Apr.
<i>Candytuft</i>	various	12	Hardy	Mar./Aug.	Sep. Sep.	Direct in border	Mar.	Nov.	12	Sun	Average	June-Sep.	Nov.-Dec.
<i>Canterbury bells</i>	blue, pink, white	30	Hardy	Feb. Aug.	Jan./Sep.	Direct in border	Apr.	Mar./Nov.	12	Sun	Average	June-Oct.	Nov.-Dec.
<i>Carnation, annual</i>	various	18	Hardy	Feb. Aug.	Sep. Sep.	Direct in border	Oct.	Nov. Mar.	12	Sun	Average	Oct.-Nov.	Nov.-Dec.
<i>Celosia</i>	red, yellow	18-30	Hardy	Aug. Aug.	Sep. Sep.	Direct in border	Oct.	Nov. Mar.	10-15	Sun	Average	Sep.-Dec.	Oct.-Nov.
<i>Celsia*</i>	various	18	Hardy	Jan./Aug.	Sep. Sep.	Direct in border	Oct.	Nov. Mar.	7	Sun	Average	Dec.-Feb.	Jan.-Mar.
<i>Cineraria</i>	various	15-30	Hardy	Mar. Mar.	Oct. Oct.	Direct in border	Oct.	Nov. Mar.	12-18	Sun	Average	Jan.-Mar.	Jan.-Mar.
<i>Chrysanthemum, annual</i>	various	18-30	Hardy	Aug. Aug.	Sep. Sep.	Direct in border	Oct.	Nov. Mar.	12	Sun	Average	Jan.-Mar.	Jan.-Mar.
<i>Clarkia</i>	various	24	Hardy	Mar./Apr.	Oct. Oct.	Direct in border	Nov.	Nov. Mar.	6-8	Sun	Average	Dec.-Jan.	Dec.-Jan.
<i>Cleome (Spider flower)</i>	pink	36	Hardy	Oct. Jan.	Dec. Dec.	Direct in border	Apr.	Mar.	10	Sun	Average	Jan.-Apr.	Jan.-Apr.
<i>Coreopsis</i>	yellow, bronze	12-36	Hardy	Aug. Aug.	Sep. Sep.	Direct in border	Oct.	Nov. Mar.	6-10	Sun	Average	Oct.-Dec.	Oct.-Dec.
<i>Cornflower</i>	various	24-36	Hardy	Mar./Apr.	Oct. Oct.	Direct in border	Nov.	Nov. Mar.	10-12	Sun	Average	Jan.-Apr.	Jan.-Apr.
<i>Cosmos</i>	various	24-36	Hardy	Oct. Jan.	Dec. Dec.	Direct in border	Apr.	Mar.	6	Sun	Average	Aug.-Oct.	Oct.-Dec.
<i>Dahlia, bedding*</i>	white, pink	12-18	Hardy			Direct in border	Oct.	Nov. Mar.	10	Sun	Average	Jan.-Apr.	Jan.-Apr.
<i>Daisy (Bellis perennis)*</i>	various	9	Hardy	Aug. Aug.	Sep. Sep.	Direct in border	Oct.	Nov. Mar.	10-12	Sun	Average	Jan.-Apr.	Jan.-Apr.
<i>Delphinium (Blue butterfly)*</i>	blue	15	Hardy	Aug. Aug.	Sep. Sep.	Direct in border	Oct.	Nov. Mar.	10	Sun	Average	Jan.-Apr.	Jan.-Apr.
<i>Dianthus, bedding</i>	various	12-24	Hardy	Feb. Aug.	Jan./Sep.	Direct in border	Oct.	Nov. Mar.	10-12	Sun	Average	Oct.-Jan.	Dec.-Jan.
<i>Dimorphanthea</i>	various	12	Hardy	Aug. Aug.	Oct. Oct.	Direct in border	Mar./Oct.	Nov. Mar.	6	Sun	Average	Dec.-Jan.	Dec.-Jan.
<i>Eschscholtzia</i>	yellow, bronze	6-18	Hardy	Aug. Aug.	Oct. Oct.	Direct in border	Mar./Oct.	Nov. Mar.	6	Sun	Average	Dec.-Jan.	Dec.-Jan.
<i>Forget-me-not</i>	blue, pink, white	6-15	Hardy	Mar. Mar.	Jan. Jan.	Direct in border	Sep.	Apr.	6	Sun	Average	Oct.-Nov.	Dec.-Jan.
<i>Gaillardia*</i>	yellow, red, orange	15-30	Hardy	Aug. Aug.	Oct. Oct.	Direct in border	Sep.	Apr.	12	Sun	Average	Aug.-Sep.	Dec.-Jan.
<i>Geranium*</i>	red, pink	24	Hardy			Direct in border	Sep.	Apr.	15	Sun	Average	Oct.-Nov.	Dec.-Jan.
<i>Gilia</i>	blue	12-24	Hardy	Aug. Aug.	Oct. Oct.	Direct in border	Sep.	Apr.	15	Sun	Average	Oct.-Nov.	Dec.-Jan.
<i>Godetia</i>	various	6-30	Hardy	Apr./Aug.	Sep. Sep.	Direct in border	Mar.	Nov.	6-12	Sun	Average	Nov.-Jan.	Dec.-Feb.
<i>Gypsophila, annual</i>	pink, white	18	Hardy	Aug. Aug.	Oct. Oct.	Direct in border	Mar.	Nov.	12	Sun	Average	Dec.-Jan.	Jan.-Feb.
<i>Iceland poppy</i>	various	15	Hardy	Jan. Jan.	Dec. Dec.	Direct in border	Mar.	Nov.	10	Sun	Average	Jan.-Feb.	Jan.-Feb.
<i>Kochia (Summer cypress)</i>	foliage	24	Hardy	Aug. Aug.	Oct. Oct.	Direct in border	Mar.	Nov.	15-24	Sun	Average	Apr.-Nov.	May-Dec.
<i>Larkspur</i>	pink, blue, white	18-30	Hardy	Mar. Mar.	Sep. Sep.	Direct in border	Mar.	Nov.	10	Sun	Average	Jan.-Mar.	Jan.-Mar.
<i>Linum</i>	various	6-30	Hardy	Aug. Aug.	Oct. Oct.	Direct in border	Mar.	Nov.	3-8	Sun	Average	Oct.-Nov.	Dec.-Jan.
<i>Lobelia (Flax)</i>	blue, white	9-24	Hardy	Apr./Aug.	Sep. Sep.	Direct in border	Apr.	Nov.	6	Sun	Average	Dec.-Jan.	Dec.-Jan.
<i>Love in the mist (Nigella)</i>	blue, white	4-6	Hardy	Apr./Aug.	Sep. Sep.	Direct in border	Apr.	Nov.	3-8	Sun	Average	Oct.-Nov.	Dec.-Jan.
<i>Marigold, African</i>	blue, white	18	Hardy	Sep. Dec.	Oct. Oct.	Direct in border	Oct.-Jan.	Nov. Nov.	8	Sun	Average	Sep./Apr.	Oct.-Feb.
<i>Marigold, French</i>	yellow, orange	24-36	Hardy	Apr./Aug.	Sep. Sep.	Direct in border	Sep.-Feb.	Nov. Nov.	15-18	Sun	Average	Jan.-May	Feb.-May
<i>Marigold, winter flowering</i>	yellow, orange	6-18	Hardy	Jan.-Feb.	Oct. Oct.	Direct in border	Mar.-Apr.	Nov. Nov.	6-12	Sun	Average	Oct.-May	Dec.-Apr.
<i>Mesembryanthemum (Livingstone daisy)</i>	various	18-24	Hardy			Direct in border	June	Oct.	15	Sun	Average	June-Sep.	Dec.-Apr.
<i>Mignonne</i>	orange	4	Hardy	Apr. Apr.	Sep. Sep.	Direct in border	June	Oct.	6	Sun	Average	Sep.-Oct.	Dec.-Jan.
<i>Nasturtium (Tropaeolum)</i>	yellow, red	9-15	Hardy	Feb. Aug.	Jan./Sep.	Direct in border	May	Nov.	6-10	Sun	Average	Apr./Nov.	Apr./Nov.
<i>Nemesia</i>	various	12	Hardy	Aug. Aug.	Sep. Sep.	Direct in border	May	Nov.	12	Sun	Average	Oct.-Jan.	Dec.-Feb.
<i>Oenothera*</i>	yellow	6-12	Hardy	Apr./Aug.	Sep. Sep.	Direct in border	Mar.	Nov.	9	Sun	Average	Sep.-Oct.	Dec.-Mar.
<i>Pansy*</i>	various	12-24	Hardy	Jan. Jan.	Aug. Aug.	Direct in border	Oct.	Nov.	8	Sun	Average	May-Nov.	Dec.-Mar.
<i>Petunia</i>	various	6	Hardy	Aug. Aug.	Sep. Sep.	Direct in border	Mar.	Nov.	10	Sun	Average	Nov.-May	Dec.-Apr.
<i>Phlox drummondii</i>	various	12	Hardy			Direct in border	Oct.	Nov.	8-10	Sun	Average	Nov.-May	Dec.-Apr.

Bedding Plants Brighten the Flower Garden—Continued

Name	Colour	Height in.	Hardiness	Sowing time		Sowing method	Planting time		Distance apart in.	Situation	Soils	Flowering period	
				North	South		North	South				North	South
Polyanthus*	various	10	☆	Nov.	Oct.-Nov.	Direct in border	Apr.	Mar.	10	☆	Average	Aug.-Oct.	Sep.-Nov.
Portulaca	various	6	☆	Sep.	Oct.-Nov.	☆	Oct.-Nov.	Nov.-Dec.	6	☆	Moist	Dec.-Mar.	Dec.-Mar.
Primula malacoides	pink, mauve	12	☆	Jan.	☆	☆	Mar.-April	☆	9	☆	Dry	Aug.-Oct.	☆
Salpiglossis	various	24	☆	Aug.	Sep.	☆	Oct.	Nov.	10	☆	Average	Dec.-Mar.	Jan.-Mar.
Salvia	red	12-30	☆	Aug.	Sep.	☆	Oct.	Nov.	10-15	☆	Moist	Dec.-May	Jan.-May
Scabious, annual	various	36	☆	July	Sep.	☆	May	Oct.	12	☆	Average	Dec.-Nov.	Dec.-Feb.
Schizanthus	various	12-24	☆	Mar.	Sep.	☆	Sep.	Nov.	10-15	☆	Moist	Aug.-Nov.	Dec.-Jan.
Stachys	pink, white	6-12	☆	Mar.	Aug.	☆	May	Oct.	6-8	☆	Average	Aug.-Oct.	Nov.-Dec.
Stilene	various	30	☆	June	all year	☆	Aug.	Nov.	12	☆	Moist	Oct.-Feb.	Dec.-Mar.
Stock, bedding types	various	12-24	☆	Jan./Mar.	all year	☆	Feb./Sep.	all year	15	☆	Average	May/Dec.	all year
Stock, Brompton	various	24	☆	Apr./Aug.	Aug.-Oct.	☆	May	Sep.-Nov.	12	☆	Moist	Sep.	Oct.-Nov.
Sweet pea, dwarf	various	72	☆	June	Aug.	☆	May	Oct.	8-12	☆	Average	Oct.-Jan.	Dec.-Mar.
Sweet pea, tall	various	12	☆	Aug.	Oct.	☆	Aug.	Nov.	8	☆	Moist	Oct.-Jan.	Dec.-Feb.
Sweet William*	various	9-18	☆	Aug.	Jan.	☆	Apr.	Nov.	8-12	☆	Average	Oct.-Nov.	Dec.-Mar.
Tithonia	orange	36-60	☆	Aug.	Sep.	☆	Oct.	Dec.	5	☆	Moist	Jan.-Mar.	Feb.-Mar.
Tropaeolum (Canary creeper)	yellow	36	☆	Sep.	Sep.	☆	Nov.	Dec.	12	☆	Average	Oct.-Jan.	Dec.-Mar.
Ursinia	orange	4-12	☆	Aug.	Sep.	☆	Oct.	Nov.	6-8	☆	Moist	Nov.-Dec.	Dec.-Jan.
Veronica*	various	12-24	☆	Aug.	Sep.	☆	Oct.	Nov.	6-8	☆	Average	Dec.-Jan.	Jan.-Feb.
Viola*	blue, red, white	6	☆	Jan.	Sep.	☆	Oct.	Nov.	10	☆	Moist	Nov.-Apr.	Dec.-Apr.
Viola*	various	9-15	☆	Apr.	Jan./Aug.	☆	Mar.	Mar./Oct.	8	☆	Average	May-Nov.	Jan.-Feb.
Wallflower*	various	12-18	☆	Nov.	Sep.	☆	Nov.	Apr.	6-8	☆	Moist	Sep.-Oct.	Jan.-Nov.
Zinnia	various	9-30	☆	Sep.	Oct.	☆	Nov.	Dec.	8-12	☆	Average	Jan.-Mar.	Sep.-Apr.

* Plants marked with asterisk can sometimes be grown for several years. Where sowing, planting, and flowering months are hyphenated (Mar.-June) it indicates the whole period.

Where months are separated by a bar (Mar./June) it indicates two separate months suitable for sowing, or when flowering can be expected to start.

and become drawn, which can easily result in damage from wind and rain. When spaced sufficiently the plants can grow to full stature and usually produce a better crop of flowers. After planting, a light watering should be given to settle the soil round the roots of the plants.

Maintenance

During the first 2 weeks after planting, special attention should be given. If the ground has been well moistened beforehand, watering may not be necessary, but if hot and dry winds prevail, light sprinklings over and round the plants will be very beneficial.

The soil should be kept loose round the plants, either by hoeing or light forking. This will prevent a crust forming and allow aeration of the soil, and at the same time it will kill any weeds which may have germinated. When the plants have grown so thick that cultivation becomes difficult it need only be done periodically, preferably after watering. Large weeds should be removed.

Watering should be carried out when necessary and should be thorough. Once the plants are established light watering should be discontinued, as it tends to keep the roots near the surface.

Because annuals quickly deteriorate if seed is allowed to form and because dead flowers are unsightly they should be removed frequently.

Edges of flower beds should always be neat and tidy. If placed along a lawn, they should be on an even line and kept trimmed.

Troubles

Most bedding plants are not very subject to diseases, but some are known to be a host for certain troubles.

Antirrhinums, for example, are now difficult to grow because they are liable to infection with rust fungus, for which there is no practical control to date. Rust-resistant varieties from overseas have not proved satisfactory in New Zealand, as they have not proved resistant to the strains of rust present in this country.

Asters become troubled with wilt and wilt-resistant varieties only should be used. Plants which have been checked in growth are more likely to become affected with wilt.

Pests such as aphids, thrips, and caterpillars will attack many bedding plants, and the normal control methods should be carried out.

An article dealing specifically with pests and diseases in the flower garden will shortly appear in the "Journal".

Troubles can also be encountered if bedding plants are grown out of season, as they may then not develop satisfactorily. Plants are sometimes

SPEEDWAY
STERILISER



BURNS OIL OR WOOD

Write for FREE
Illustrated Catalogue

SPEEDWAY PRODUCTS LTD.
GT SOUTH ROAD, PENROSE
P.O. BOX 24 and at
FORD BUILDINGS, COURTENAY PLACE
WELLINGTON
139 WORCESTER ST CHRISTCHURCH

STEAM & BOILING WATER

VITE-ADEE CALF EMULSION

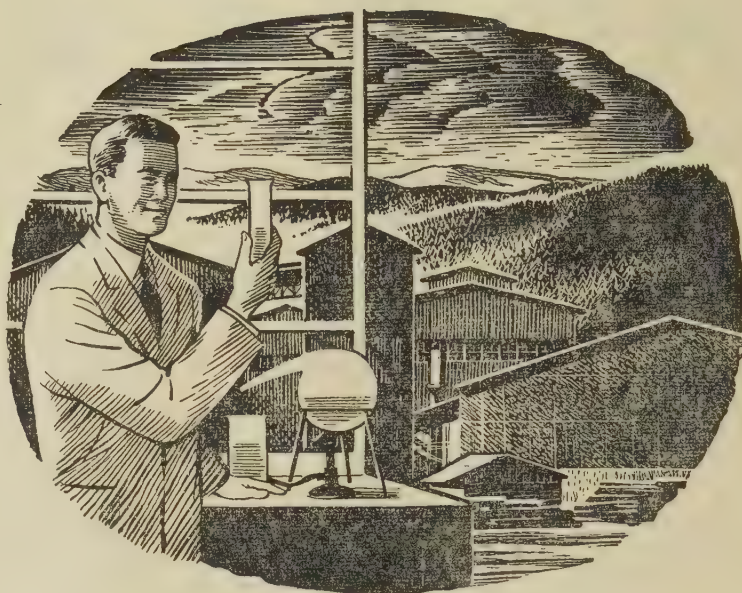
*Feed
One Teaspoon
per Calf per day
and put back the
Butterfat Vitamins*

● The vitamins in CALF EMULSION replace the butterfat vitamins, the absence of which often lead to scouring. Vite-ADee Emulsion mixes right through the skim or whey and your calves find it so palatable that, quite literally, they lick it up to the last drop.

VITE-ADEE CALF EMULSION

Write for Free Leaflet to
W. & R. FLETCHER (N.Z.) LTD.
BOX 594, WELLINGTON.

G.7218

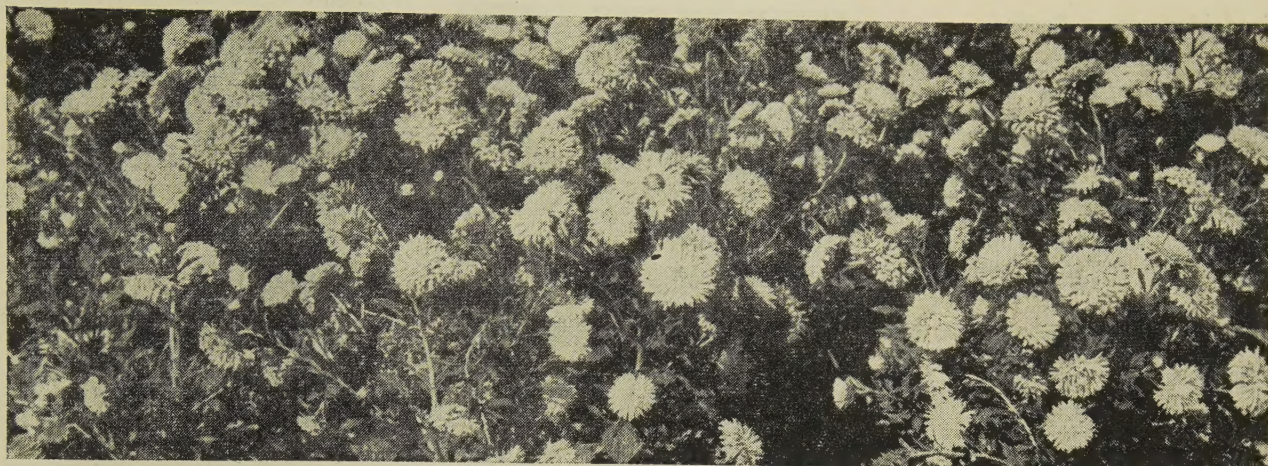


9. A TREE USED IS A TREE GROWN

Forestry maintains a wide and continuing program of research, always with an eye to the economics of timber production and utilisation. The complex story of timber science begins in the forest with climatic and soil fertility research, the selection of pedigree seed stocks, establishment of nurseries and the study and prevention of insect and fungal danger to both native and exotic forests. The aim is always to improve the quality of timber for the benefit of its ultimate user. The New Zealand Forest Service, in collaboration with other scientific departments and universities also carries out research on the correct types of wood, grades seasoning and preservation methods to provide Engineers, Architects, Builders and Manufacturers using wood as a raw material with sound information on the properties and uses of woods and wood products from the forests of New Zealand.

Forestry is forever

*Inserted in the interests of forest protection
by the New Zealand Forest Service
... Soil Conservation Council.*



Wilt-resistant varieties of asters should be chosen.

[Green and Hahn]

offered for sale at a time unsuitable for planting, and only by knowledge of the district can this be judged. Horticultural societies and garden clubs do much to assist their members and reserves staff are always helpful with such advice.

The Chart

The chart on pages 100 and 101 is designed to assist home gardeners in selecting and growing bedding plants. Because climate varies so much (even within each island general recommendations only can be made), development of the plants is governed by the conditions prevailing in any particular garden during any particular season. Even soil type, fertiliser supply, and moisture can influence time and length of flowering considerably.

Garden Work for August



The early blooms of crocus, *Iris reticulata*, lachenalia, violet, snow-drop, and the other species which are now appearing warn that spring is approaching. Any work which should

have been done in winter must be completed this month.

Garden Reconstruction

Ideas for reconstruction will have been considered during the previous growing season and now, when many plants are still dormant, these new ideas and features can be put into practice.

In all garden planning the aim should be to make use of any existing features, but at the same time creating deeper interest by one or two well-placed focal points. These may be developed out of existing features.

Plain flower borders need to be relieved by one or two special features such as a garden seat, a specimen tree or shrub, a garden pool, a rocky outcrop suitably planted, a terraced garden, an archway, or outdoor living area.

Rock Work

In rock work the use of a limited number of large stones is preferable to many small ones. Small stones, however, may be useful for filling in. For the most natural effect all the rocks should be tilted back at the same angle and the grain of the rocks should be parallel throughout.

All rocks should be securely set, preferably two-thirds of their depth in the soil, and the soil well rammed in. Grouping of the plants and rocks is more effective and appears more natural. The harmony of the garden is broken when a "spotting" effect is created.

For rock walls and garden paths more care should be taken in the selection of stones. This extra time in selection and construction will be worth while. If desired, concrete may

be used to secure strategic stones or paving stones. At this time of the year it will be obvious whether stepping stones could be used to advantage in any part of the garden. Service areas can often be greatly improved by placing flat slabs of rock or concrete slightly below the level of the grass so that the lawnmower will run smoothly over them.



Antirrhinum, which has always been a great favourite, now succumbs to rust.

[Elliott]

Mixed Herbaceous Border

If the border was dressed with bulky manure in autumn, this may now be forked into the topsoil. The plants may have become too large and to divide them they should be lifted and the area treated with compost or rotted farmyard manure. A dressing of complete fertiliser containing 3 parts of blood and bone, 2 parts of superphosphate, and 1 part of sulphate of potash (all parts by weight) could be applied to the soil surface at 2oz. per square yard.

Vigorous and healthy sections from the outside of the old clumps should be used for replanting.

Pruning of Shrubs

There are three groups of flowering shrubs which may be pruned now. Immediate attention should be given to those shrubs which flower on wood produced in the current season and make strong annual growth. These should be cut back very hard to within a few inches of the older wood. Young plants need have only the tips of the shoots removed. This group includes *Ceratostigma willmotianum*, *Erithrina crista-galli*, and *Spiraea japonica*.

The second group which may be pruned now comprises such plants as hydrangeas, fuchsias, and diervilla, which flower on new growths developing on wood produced in the previous season. These also make strong annual growth. Weak shoots should be removed and branches which flowered last season should be cut back to three or four buds. Strong 1-year-old wood can be tipped and left to produce this year's flowering wood. Try to maintain a shapely bush through pruning.

In the third group of shrubs for late winter pruning are those evergreen subjects which flower during winter and which can be lightly pruned back after flowering to help retain their shape. Examples of these are erica, thryptomene, and boronia.

Planting of Shrubs

Any hardy deciduous shrubs may be planted now if soil conditions are satisfactory. If from seasonal observations it has been decided to transplant some specimens, August is a good month. Care should be taken to retain as much soil as possible round the roots of the plant and a sack or canvas sheet will be found helpful. The top of the plant should be pruned so that the reduced roots will have a correspondingly smaller leaf area to support.

Lawns

In districts where summer rain is assured the sowing of lawns in spring is satisfactory, provided the area has been well cultivated in the previous autumn. The soil will be well consolidated after winter rains and any



Pot geraniums which have become leggy with last year's growth should now be pruned hard, repotted into new potting compost, and put in a warm sunny window to start off again into growth. The arrows indicate the level to which an overgrown plant should be cut back.

low spots should be filled in and made firm. If the soil has been properly prepared it will need only to be lightly hoed, and the seed broadcast and raked in. The first application of fertiliser consisting of 1oz. per square yard of a mixture of 3 parts by weight of sulphate of ammonia and 1 part by weight of superphosphate should be broadcast just before seed sowing and raked in with the seed. On page 207 of the February 1957 issue of the "Journal" care of lawns is dealt with in detail.

Seasonal Recommendations

Hasten to complete the planting of trees, shrubs, hedge plants, and roses before growth begins again.

Rose pruning, as discussed in last month's notes, should be completed by now in northern districts, but August is generally the best time to carry out this task in cooler areas.

A few gladiolus can be planted toward the end of August in warm, well-drained soils. Gladiolus which were planted and cloched in May can now be uncloched to allow the stems to develop for flowering in October.

A watch should be kept on tulips for any signs of aphids. These insects, which are carriers of the virus disease commonly known as "tulip break" because of the striping or breaking of the flower colour, will increase as the weather becomes warmer. Any diseased plants should be destroyed as soon as recognised and a special check be made on new bulbs.

Though in most districts the main seed sowing should be left until next month, a start can be made in selected areas. Where the ground was prepared in autumn, sweet peas can now be sown. A protective seed dust such as thiram should be used.

Indoor plants of fuchsia, coleus, geraniums, and shrubby begonias can be pruned back. Repot if necessary. Tuberous begonias can be started into growth as soon as their pink buds appear. They make attractive plants in window boxes where they are able to get a little extra warmth. Hydrangeas grown as pot plants should be given a liquid feed with one of the soluble fertilisers available on the market.

Cacti and succulents should not be encouraged into growth yet, but will appreciate a light syringe with lukewarm water when the days are warm and sunny. Seeds of these plants can be sown toward the end of August in well-drained and preferably shallow containers, which should be placed behind glass in a sunny position.

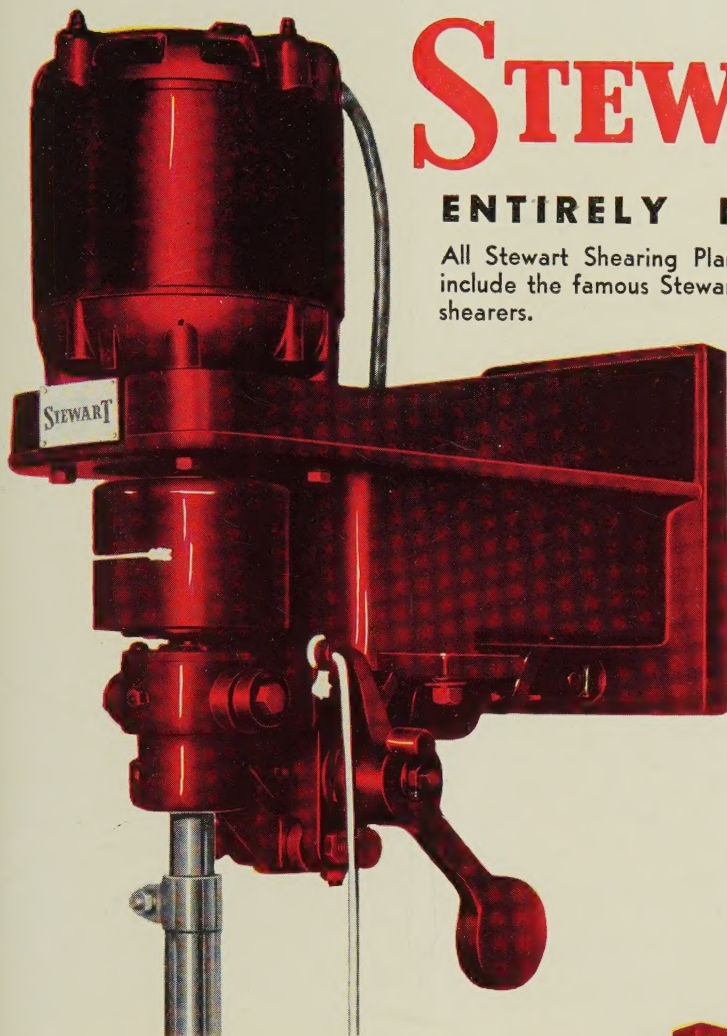
A close watch should be kept for the ravages of slugs, snails, woodlice, and other common pests and DDT or lindane dust or baits should be used liberally to destroy them.

STEWART

PROUDLY
ANNOUNCE

ENTIRELY NEW ELECTRIC GEAR

All Stewart Shearing Plants are supplied complete in every detail and include the famous Stewart E.B. Handpiece, the choice of nine out of ten shearers.



VERTICAL TYPE

This new model is the result of long and careful research, study and improvement wherever possible of the previous type. It has been precision-built—tested—pulled down and again tested. These tests, over a long period (much more severe than normal use), have seen it come out with flying colours. The new vertical gear is the answer to electric shearing efficiency, reliability and long service.

HORIZONTAL TYPE

Stewart have developed this additional model specially for the small woolshed—it's a two-purpose unit that has all the Stewart quality and precision workmanship behind it. Provision has been made for driving a single-ended, belt-driven, ball-bearing grinder direct from the shearing motor without the use of a countershaft and this combination provides the most economical and complete electric shearing plant for the smaller sheep owner.



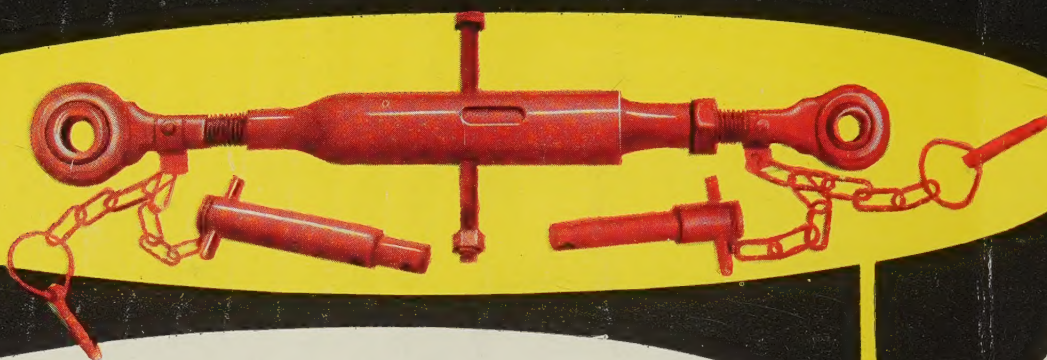
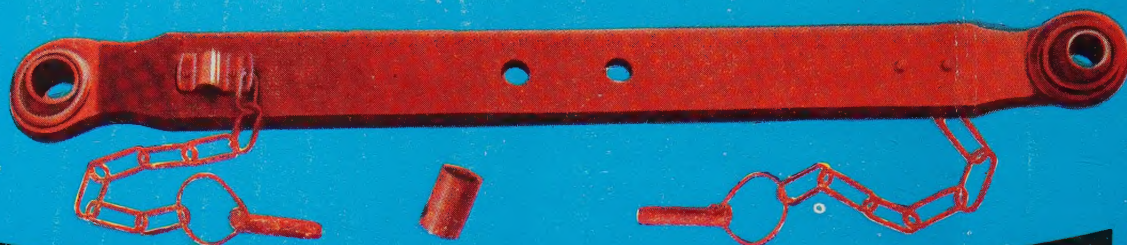
STEWART SERVICE ON THE FARM.

Stewart quality is backed by unequalled service facilities provided by a specially trained staff of experts.

Made and guaranteed by the Sunbeam Corporation Ltd., Australia.

SOLE NEW ZEALAND DISTRIBUTORS:

WRIGHT STEPHENSON & CO. LIMITED



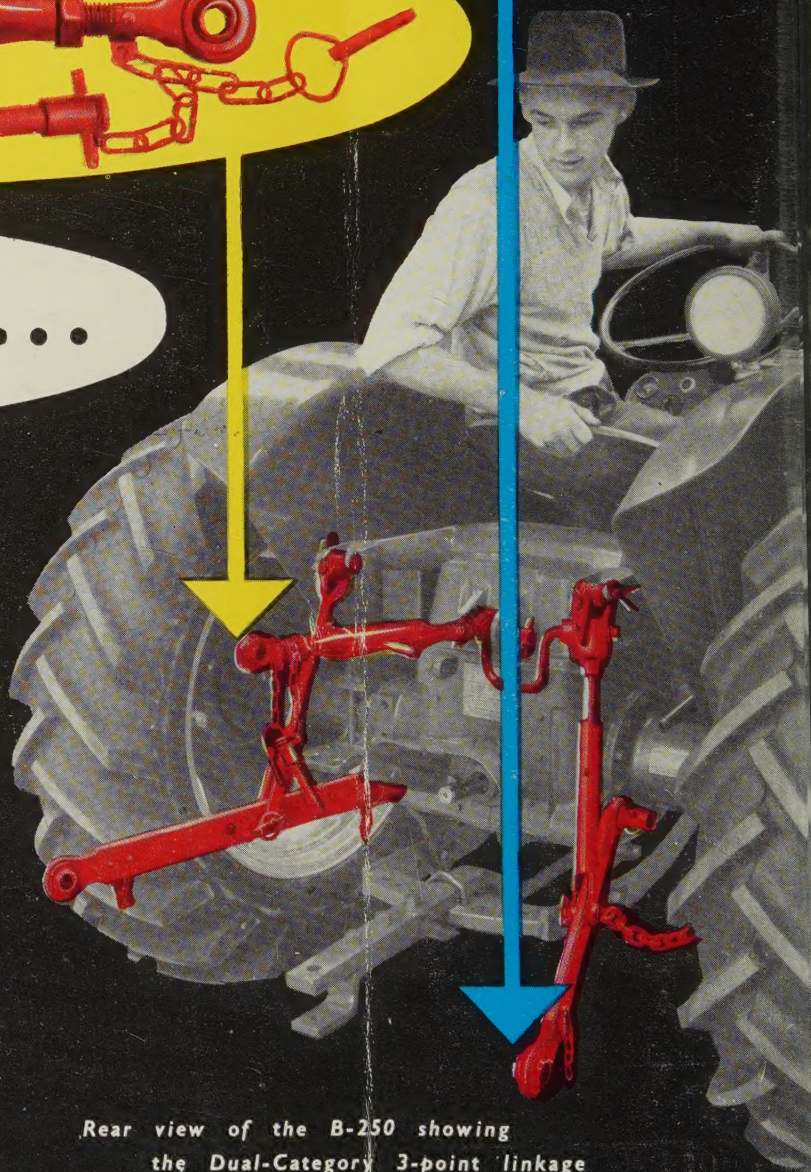
DO YOU KNOW...

Whatever your make
of implement the
B-250 LINKAGE SYSTEM
fits every one!

We heard of a farmer who didn't know that the great new McCORMICK INTERNATIONAL B-250 tractor would take every 3-point implement manufactured today regardless of make. But it's an absolute fact. You can retain your present 3-point implements, and put to work on your farm a tractor that will outwork every other in its class. The tremendous advance in tractor versatility is achieved by making the links completely reversible. See it and you'll see how easily it's done!

Remember too, that the B-250 is the only British tractor with Differential Lock and self-energising Disc Brakes . . . plus reversible 3-point links, inbuilt weight transfer, live hydraulics and front and rear worklights.

£767 - 10 - 0



Rear view of the B-250 showing
the Dual-Category 3-point linkage

Over 3 Million
Tractors Prove



SUPERBILITY

MCCORMICK
INTERNATIONAL

INTERNATIONAL HARVESTER

INTERNATIONAL HARVESTER COMPANY OF N.Z. LTD.

Branches and Dealers throughout New Zealand